Intra-household Differences in the Reported Experiences of Elementary and Middle School-Aged Orphans when Compared with Co-resident Non-orphans in Haitian Households

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Dedication

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Abstract

There is continued concern that orphans may experience additional risks and disadvantages across multiple domains when compared with non-orphans. The concern for orphan vulnerability extends to differential treatment in the households where orphans reside. This exploratory study assesses if the Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans treat children differently based on their orphan status. It seeks to understand if, and to what extent, orphan care-giving family characteristics such as household, head of household, and child characteristics moderate intra-household experiences between orphans and co-resident non-orphans to impact orphans' mosquito net usage, years reported attending school, hours spent fetching water or wood, and hours spent performing domestic household work.

Secondary data analysis of the 2012 DHS survey in Haiti was conducted. Six hundred ten households with elementary and middle school-aged orphans and co-resident non-orphans were analyzed for intra-household differences through matched pairs t-test, multivariate analysis of covariance, and univariate analysis of covariance. The findings indicate that there are intra-household differences in the reported experiences of orphans when compared to their co-resident non-orphans for mosquito net usage, years attended school, hours spent fetching water or wood, and hours spent performing domestic household work. However, the amount of intra-household difference between orphans and co-resident non-orphans is minimal and should be interpreted with caution. The findings suggest that different combinations of household size, household wealth, orphan gender, and an orphan's relatedness to their head of household can predict intra-

household differences for reported mosquito net usage, years attended school, and hours spent performing domestic household work. No factors in the present study could predict differences in hours spent fetching water or wood. Moderating variables explained very little about intra-household differences. Although the findings of this study do not offer clear implications for policy or practice, implications for further assessment of intra-household differences and family functioning in international settings and in Haiti are specifically discussed.

Key Words: Orphans, Haiti, Intra-Household Differences, DHS survey

TABLE OF CONTENTS

LIST OF TABLES

List of Figures

List of Appendixes

Chapter One: Introduction

Background

The term *orphan* often evokes the image of a parentless child, possibly living in institutional care. However, *orphan* technically refers to a child under age 18 who has lost one or both parents but still lives in family care with their sole surviving parent, extended family members, adult siblings, non-relative caregivers, informal or formal foster family, or with other children in a child-headed household (UNICEF, 2010). This means the 153 million children who are counted as orphans in United Nations and U.S. Government statistics currently live in some form of family care (UNICEF, 2010). The enumeration of orphans worldwide does not include children who live outside of family care in an institution or on the street.

Even though orphans live in families, there is a concern that being an orphan increases a child's vulnerability across multiple domains. Before exploring orphans' possible vulnerability across different domains, it is important to clarify the relationship between risk and vulnerability in the literature. Risk is defined as "… any event, condition, or experience that increases the probability that a problem will be formed, maintained or exacerbated" (Fraser & Terzian, 2005, p. 5). Risk acknowledges that children with similar characteristics such as age or gender under similar circumstances might vary in their likelihood of developing different problems. The presence of risk factors is not deterministic of future problems; rather risk factors increase the likelihood that an issue such as poor school performance or depression could be developed,

sustained, or aggravated (Fraser & Galinsky, 2004). In addition, risk factors might directly relate to negative outcomes or they might signify processes that relate to negative outcomes (Fraser, Kirby & Smokowski, 2004). For instance, in some countries, orphans might be at risk for lack of family permanency. This means orphans might move frequently between extended family households but not reside in one household permanently. The physical moves and psychosocial transitions that occur when there is lack of permanency are associated to poor outcomes for orphans, like increased anxiety as well as poor school performance (Ansell & Young, 2004).

Risk factors do not always have sequential processes. Instead, risk factors might represent complex relationships where risk accumulates (Fraser & Galinsky, 2004). For instance, an orphaned child may withstand various risk factors such as multiple household moves within the family system, disrupted schooling, separation from siblings, and poorer health, but might eventually be affected by depression as they reach their late teens and transition to adulthood. Protective factors are also essential for understanding risk. Fraser and Terzian (2005) define protective factors are "as resources – individual or environmental – that minimize the impact of risk" (p. 12).

It is important to note that the definition of risk is rooted in ecological models of human development (Fraser et al., 2004) that take into consideration the family and social contexts, and layers of systems, that effect the unfolding of human potential and lived experience (Bronfenbrenner, 1979). It also conceptualizes risk as rooted in the transactional model that examines the interplay of children's characteristics and a children's environment on child outcomes (Sameroff, 1983; 1993). Children's social and environmental context can stimulate and perpetuate poor functioning by subjecting

children to detrimental experiences or it can encourage high functioning by increasing children's social support and creating opportunities for positive growth (Fraser et al., 2004). Thus, social and environmental contextual factors are nested at different levels in a child's ecosystem including the family (Fraser et al., 2004).

The World Bank's Orphan and Vulnerable Children Toolkit (2005) explains that vulnerability occurs when a child is being exposed to more risks than their peers. The more risk factors a child is exposed to, the more vulnerable the child becomes. Skinner et al. (2006) observe that this construct of vulnerability is problematic, as it has no implicit definition or statement of who is included or excluded. Nevertheless, the literature on orphaned children links risk with vulnerability and often utilizes the terms interchangeably (World Bank, 2005; Akwara et al., 2010; Skinner et al., 2006).

Indeed, the construct of orphan vulnerability is a heterogeneous, multidimensional phenomenon that has been problematic to define, monitor, and evaluate as it intersects children's basic needs, human rights, family issues, and local cultures (Akwara et al., 2010; Office of the United States AIDS Global Coordinator [PEPFAR], 2009; Skinner et al., 2006). Evidence indicates that local, national, and regional differences uniquely affect orphans' vulnerability (Boothby et al., 2012; Akwara et al., 2010; Engle, 2008). For example, Akwara et al. (2010) analyzed survey data from orphans and non-orphans to determine if orphans have increased vulnerability for early sexual debut. They found differences between orphans and non-orphans in 17 of the 23 countries analyzed. However, in only seven countries there were statistically significant differences in sexual debut before age 15 for orphans when compared to their non-orphan peers (Akwara et al., 2010). This example illustrates how risk factors for orphans are not universal. Orphans

might be at risk for an issue like early sexual debut in one country, but not in another country. The research of Akwara et al. (2010) also demonstrates the lack of universal risk factors for orphans in other domains including health and education.

Thus, the field needs exploratory country specific research to determine where orphans' may experience risk, strengthen its understanding of risk when detected, and understand how contextual factors might affect orphans' realization of their developmental potential. The need for additional exploratory research is important given that the evidence base for orphans' vulnerability grew out of the HIV/AIDS epidemic in Sub-Saharan Africa (Akwara et al., 2010). UNICEF (2013) is currently exploring orphan vulnerability in Cambodia and Haiti in addition to Sub-Saharan Africa, but more studies that are exploratory are needed. Over 97 million of the world's 153 million orphans live outside of Sub-Saharan Africa and/or are orphaned due to reasons other than HIV/AIDS (UNICEF, State of the World's Children, 2012). For this reason, exploratory research efforts outside of Africa might further inform the field's understanding of where orphans experience risk and what factors might increase and/or reduce risks for orphans.

According to Fraser and Galinsky (2005), it is important to understand these theoretical frameworks and to develop knowledge of risk factors in order to more accurately design and evaluate intervention programs so there is evidence-based practice. Knowledge of risk factors is also essential to the development of sound family social policy (Jenson & Fraser, 2011), as these policies affect "resource allocation, costing, implementation, and trend analysis" (Akwara et al., 2010, p. 1079) that directly affect orphaned children and their families. Moreover, a deeper understanding of risk factors

will help target prevention/intervention programs to the sub-groups of orphaned children who would benefit most from programs' services (Schenk et al., 2008a).

Categories of risk for orphans. Orphans might experience risk in different ways while in family care. In countries and communities where risks are known to exist, risks tend to be heightened or diminished based on household wealth, familial wealth, quality of the sole surviving parent's parent-child relationship, presence or absence of illness in the immediate or extended family, child's gender, child's age, child's developmental stage, child's physical and cognitive abilities, household composition, the gender of the deceased parent, community of current residence, community wealth, community resources, and more (UNICEF, 2004; PEPFAR, 2009). Based on the literature where risks have been found, poor outcomes for orphaned children can be consolidated into eight groups or categories of risk. The potential risk categories for orphans include survival, health, stability/permanency, education, psychosocial, abuse, exploitation, and inheritance based economic challenges. The risks reflected in these categories are pervasive and worsen when there are armed conflicts or natural disasters. These situations expose vulnerable children and families to additional risks and deepen existing ones (USAID, 2010).

The first risk is survivability. Survivability risks tend to be risks associated with poor health and nutrition and meeting children's basic needs. A nineteen-country study in Sub-Saharan Africa indicated that orphaned children living with extended family members were worse off than children living with their biological parents (Case, Paxson, & Ableidinger, 2004). In Malawi, for example, households caring for more than one orphan were more likely to report moderate to severe food insecurity than households

without orphans. Kimani-Murage et al. (2011) concluded that extended family households caring for orphans might be able to provide for one additional child without major threats to food security, but cannot support more than one orphan without dire consequences. Survivability risks might be particularly heightened for young children under age 3 who have lost their mothers or have a mother who is dying. These children are 3.9 times more likely to die in the year before or after their mother's death than other children of this age group (Witter, Calder, & Ahimbisibwe, 2004).

Second, there are health risks. Data from several countries suggests that orphans are less likely to receive medical attention when ill and are more likely to be unimmunized, miss routine medical visits, be underweight, and have shorter stature when compared to non-orphaned peers in their communities (Radcliff, Racine, Huber, & Whitaker, 2012; Heymann, Earle, Rajaraman, Miller, & Bogen, 2007; Miller, Gruskin, Subramanian, & Heymann, 2007; Munaaba et al., 2004).

Third, there are stability/permanency risks. These can occur when an orphan lives with extended family or a non-relative caregiver that has few or diminished economic resources. Due to economic instability, orphans might be at risk of multiple moves within the extended family or community. A study by Ansell and Young (2004) in Malawi indicates that orphans might experience as many as five moves depending on their family situation. In these situations, the lack of permanency and stability can affect children's emotional and physical well-being and educational attainment.

Fourth, there is inheritance based economic risk. Inheritance based economic risk is associated with loss of income, property, or other assets from deceased parents that compromise an orphan's short- and long-term financial future (PEPFAR, 2009). In

developing countries, few poor people create official wills, increasing the risk that property will be taken by others in the family or the community. Even when wills are in place, orphaned children might still face economic risk. Despite inheritance laws, many Sub-Saharan countries cannot adequately protect orphans' rights (Rose, 2005; UNICEF, 2006).

Fifth, there is educational risk. Educational risk involves leaving school early due to lack of time or money, the need to engage in child labor to support the household, or lack of hope for the future (PEPFAR, 2009). Evidence from studies on orphan versus non-orphan school enrollment and performance is mixed, and at times contradictory, depending on the country being studied. It appears that there could be different types of missed educational opportunities for orphans, and that there might be differences in the educational trajectories for orphans versus non-orphans (UNICEF, 2006).

Sixth, there are psychological risks. These risks include depression, post-traumatic stress disorder, and the stress of caring for sick or younger household members (PEPFAR, 2009). A study of orphans in Uganda indicated that orphans tend to be at risk for increased anxiety, depression, and anger, along with inactivity, feelings of hopelessness, and suicidal ideation (Atwine, Cantor-Graae, & Bajunirwe, 2005). Toxic stress can be an orphans' mental health concern when an orphan has had adverse childhood experiences (Boothby et al., 2012).

Seventh, there are exploitation risks. Exploitation risks involve a downward trajectory of exploitation due to the loss of one or both parents (PEPFAR, 2009). For example, some countries report that orphans are potentially vulnerable for gang recruitment, child soldier recruitment, being trafficked for child labor, or being trafficked

for sexual exploitation (PEPFAR, 2008). Orphans might also be at risk for exploitative domestic work and child labor within their care-giving household (Ansell & Young, 2004).

Eighth, and lastly, there are various abuse risks. Orphaned children might be disproportionately exposed to family violence and could be more likely to become victims of sexual abuse from uncles, stepfathers, and cousins (UNICEF, 2006). Some orphaned children living with extended family members report that their guardians were angry and frustrated due to the burden of caring for them, and that caregivers' burden fueled their violence toward orphaned children (UNICEF, 2007). However, when looking across studies, there are mixed results regarding whether orphans are at a greater risk for harsh punishment and physical abuse from their caregivers as compared with their non-orphaned peers (Nichols et al., 2014; Oburu & Palmérus, 2003; Fotso, Holding, & Ezeh, 2009; UNICEF, 2006; Munaaba et al., 2004). Even though there are mixed findings on orphans' abuse risk, it is still an international child protection priority (U.S. Action Plan for Children in Adversity, 2012; Boothby et al., 2012).

In summary, the literature indicates there are eight different types of possible risk outcomes for orphaned children. These risks are variable across countries and within countries in Sub-Saharan Africa as illustrated by the previous example from Akwara et al. (2010) on early sexual debut of orphans. Beyond these eight categories of risk, some research has shown that orphan care giving households potentially provide orphans and co-resident non-orphans different experiences in the family. Intra-household differences that might create an orphan's differential disadvantage often reflect psychological, educational, and exploitation risks. For example, some recent studies have reported intra-

household difference in specific categories of risk such as health (Muhwezi, Muhangi, & Mugumya, 2009), perception of disadvantage (Goldberg & Short, 2011), education (Case et al., 2004), and household work (Betancourt, et al., 2012; Foster, Makufa, Drew, Mashumba, & Kambeu, 1997).

However, gaps remain in the literature. Specifically, there is a need to address the limitations that researchers have acknowledged about their own studies. Muhwezi et al. (2009) discussed the need for additional studies that have larger sample sizes in conducting analysis of intra-household differences. Their study analyzed 98 orphan and non-orphan pairs. Muhwezi et al. (2009) also state that future studies should explore additional outcome measures for intra-household differences as their study focused on intra-household differences in reported child illnesses, overall child health, and medical treatment.

Evans and Miguel (2007) recommend future studies analyze the effects of household relationships and resource constraints. Their study focused on the longitudinal effects of parental death on school performance. They noted that a deeper understanding of resource constraints, fostering patterns, and psychosocial issues might lead to policies that are more effective in supporting orphaned children. Likewise, Choung and Operario (2012) found that household factors effected educational outcomes for orphans. They recommended that future research explore how household size and household wealth may increase or reduce risks for orphans. Finally, Akwara et al. (2010) state that additional research is needed to identify vulnerability variables at the country/national level. They contend that national, regional, and local health issues and pockets of poverty may affect orphans' risk potential in important ways. They posit that national level risk indicators

are needed to strengthen national policy, develop national plans to support orphaned children and their families, and to create more appropriate program implementation practices (Akwara et al., 2010).

Orphans in Haiti. Haiti, from an economic perspective, is the poorest country in the Western Hemisphere (World Bank, 2014). Development statistics indicate that Haiti is a country with 10 million people and is about the size of Vermont. Eighty percent of Haitians live in poverty with nearly 55% of these living on less than one dollar a day (World Bank, 2014).

Researching issues related to orphaned children and their families means examining unjust conditions in economically disadvantaged countries. Haiti's under-developed infrastructure and persistent economic adversity provide an appropriate context to study intra-household differences in orphans' reported experiences as compared to their co-resident non-orphans because (a) it has the highest percentage of orphans in the Western Hemisphere (UNICEF, 2004); (b) one third of all Haitian households include orphans and/or other highly vulnerable children (MSPP, 2013; Gupta & Agrawal, 2010). These two realities (a) increase the likelihood of a robust sample size that addresses the recommendation of Muhwezi et al. (2009) about larger sample sizes when conducting analysis of intra-household differences; (b) respond to the need for additional research in a specific country to explore the intersection of household, head of household, and orphan characteristics with various possible indicators of vulnerability (Choung & Operario, 2012; Akwara et al., 2010; Evans & Miguel, 2007).

Problem Statement

The percentage of orphans in the worldwide child population remains high with natural disasters, international and domestic conflicts, health epidemics, and income disparities challenging children and families in many developing countries. In many countries, multiple risks might affect orphaned children, while research on the issue continues to be slow. There is a need to explore the extent of orphan risk, the associations and interactions between different possible orphan risk factors in country specific contexts, and bolster country specific evidence where risk exists, so there can be better social policy and family interventions that support households caring for orphaned children.

Moreover, there is a need to understand the extent of intra-household differences in child treatment based on orphan status, and if this difference creates a differential disadvantage for orphans when compared to co-resident non-orphans in the same household. In addition, more exploratory research is needed to better understand how contextual factors moderate risk for orphans. These contextual factors include household wealth, household size, head of household age, head of household gender, orphan gender, and an orphan's relatedness to their head of household. This information is needed to ensure orphans are in safe, healthy, family care, and to strengthen support services for households caring for orphaned children in contexts where risk is detected.

Purpose of the Study

This exploratory study aims to assess if the Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans treat children differently based on their orphan status. It seeks to understand if, and to what extent,

orphan care-giving family characteristics such as household, head of household, and child characteristics moderate intra-household experiences between orphans and co-resident non-orphans to impact orphans' mosquito net usage, years reported attending school, hours spent fetching water or wood, and hours spent performing domestic household work.

Research Questions

The following questions drive this study:

1. In Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans, to what extent are intra-household differences between orphans or co-resident non-orphans reported for mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?
2. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?
3. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do head of household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

4. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan characteristics moderate intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?
5. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan care-giving family characteristics such as household, head of household, and orphan characteristics predict intra-household differences in reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

Significance of the Study

The findings from the current exploratory study indicate that there are statistically significant intra-household differences in the reported experiences of elementary and middle school-aged orphans when compared to their co-resident non-orphans in Haitian households for mosquito net usage, years attended school, hours spent fetching water or wood, and hours spent performing domestic household work. In general, the findings of intra-household differences are consistent with studies from Goldberg and Short (2011), Beegle et al. (2010), Cluver & Gardner (2007), and Case et al. (2004) that report orphaned children experience differential disadvantage across multiple indicators in their household of residence when compared to their co-resident non-orphans. However in the present study, the amount of intra-household difference between orphans and co-resident non-orphans is minimal and the results should be interpreted with caution.

The findings from the present study indicate that household characteristics and orphan characteristics moderate intra-household differences in reported mosquito net usage, attending fewer years of school, and inequitable division of labor in two types of domestic work. Head of household characteristics do not moderate intra-household differences. In addition, the findings suggest that different combinations of household size, household wealth, orphan gender, and an orphan's relatedness to their head of household can predict intra-household differences for reported mosquito net usage, years attended school, and hours spent performing domestic household work. No factors in the present study could predict differences in hours spent fetching water or wood. However, in the present study, moderating variables such as household wealth, household size, orphan gender, and orphan's relatedness to their head of household, explained very little about intra-household differences above and beyond orphan age.

Increased knowledge on orphan vulnerability and differential disadvantage is important for government agencies, non-governmental organizations, and local non-profits that support orphans and their families (Jensen & Fraser, 2011). All of these entities can touch policy and/or practice issues that relate to orphan care and family functioning in international child welfare. Most of the findings from the present study, although statistically significant, do not have practical significance for policy or practice. The discussion of the findings speaks to the need to conduct exploratory research on other potential indicators of orphan vulnerability in Haiti and to explore locally relevant indicators of orphan risk and well-being such as quality family care, extended family support, love, and the strength of the parent-child relationship.

Definition of Terms

For the purpose of this study, the following definitions are used throughout.

Orphan. The term *orphan* means a child under age 18 who has lost one or both parents but still lives in family care with their sole surviving parent, extended family members, adult siblings, non-relative caregivers, informal or formal foster family, or with other children in a child-headed household (UNICEF, 2010b). This paper will focus on orphans in general. Nevertheless, on occasion, the terms *maternal orphan, paternal orphan*, *double orphan*, *or social orphan* might be utilized when it is relevant to summarize the literature. A maternal orphan is a child whose mother has died. A paternal orphan is a child whose father has died. A double orphan is a child who has lost both parents (UNICEF, 2010b). A social orphan is a child with one or more living parents who are incapable of providing care due to long-term incarceration, mental health concerns, chemical dependency issues, the government terminating their parental rights, or extreme hardship; a child whose parents have abandoned their parental duties; or a child whose parents *might* be alive, but whose whereabouts are unknown (World Bank, 2005).

Caregiver. Any adult, over age 18, who accepts responsibility to care for another person such as a child, someone who is ill, disabled, or in need. The international child welfare literature cited in this paper tends to utilize the word *caregiver* to describe the relationship roles between adult and child. In this paper, the word *caregiver* is not synonymous with primary caregiver nor head of household unless otherwise stated.

Co-resident Non-orphan. A co-resident non-orphan is child under age 18, with two living parents, that shares a residence with an orphaned child. The parents of the co-resident non-orphan might not reside in the same household as this child. This is a household based definition that indicates a child has two living parents.

Head of Household. In the Demographic Health Survey (DHS), adult respondents define the head of household at the time of survey. Socio-cultural considerations and other factors might create variation in how respondents define *head of household*. Some households might define it as the main provider, some might define it based on gender, and others might base their response on age. It is the subjective definition of the respondent in the household being surveyed (Ayad, Paini, Barrere, Ekouevi, & Otto, 1994).

Household. This study will use the DHS as its dataset. DHS defines a household "as a person or group of persons, related or unrelated, who live together and share a common source of food" (Institute for Resource Development, 1987, as cited in Ayad et al.,1994, p. 2). This is a residence-based definition that might include numerous adults, children, and families. It is not synonymous with an economically independent unit. Adults in the household might receive financial support from adults or children in another household even though they do not reside there.

Orphan Status. Orphan status refers to a child being categorized as either an orphan or non-orphan.

Risk Factor. This study utilizes Fraser and Terzian's (2005) definition of risk factors. They state that "… the term risk factor relates to any event, condition, or experience that increases the probability that a problem will be formed, maintained, or exacerbated (Fraser & Terzian, 2005, p. 5)." Risk factors might directly relate to negative outcomes or they might signify processes that relate to negative outcomes (Fraser et al., 2004).

Vulnerability. Vulnerability in children is defined as being exposed to more risks than one's peers (World Bank, 2005). The severity and nature of vulnerability are affected by culture and context, as well as the frequency, duration, and intensity of negative life events (World Bank, 2005).

In conclusion, this chapter has described the aims of the study, provided background information on eight categories of possible risk factors for orphans, and reviewed the problem statement. It shared the study's research questions, highlighted the significance of this research, and defined key terms. The next chapter will provide a literature review on the four potential risk factors for orphans and the six potential moderating factors that are analyzed in this study.

Chapter Two: Intra-household Differences in Orphans' Reported Experiences

This chapter provides background on how households might treat orphans and co-resident non-orphans differently based on their orphan status. It will explain how orphan care-giving family characteristics such as household, head of household, and child characteristics might moderate reported intra-household experiences between orphans and co-resident non-orphans to impact orphans' mosquito net usage, years reported attending school, hours spent fetching water or wood, and hours spent performing domestic household work.

First, the chapter begins by reviewing the method utilized to review the literature. Then, it will present an overview on children in Haiti. Next, this chapter will provide essential background on the variables analyzed in the study and the gaps in the literature, and then summarize the need for the present exploratory study. Specifically, this chapter organizes the literature review on the variables in the study into eight sub-sections: (a) children in Haiti; (b) intra-household differences based on orphan status; (c) orphan health including malaria prevention through mosquito net usage; (d) orphan education; (e) orphan participation in domestic child labor; (f) household characteristics such as household wealth and household size; (g) head of household characteristics including head of household age and gender; (h) orphan child characteristics such as orphan gender, and an orphan's relationship to their head of household.

Method

The preliminary literature review included search engines: Web of Science, Academic Source Premier, and Google Scholar. The key terms included orphan, orphans,

vulnerability, risk, education, school, discipline, child labor, household chores, domestic work, health, malaria, mosquito nets, and intra-household differences. Keywords were often combined to ensure articles related to the research topic were identified. In general, articles were from 2003 to 2014, i.e. the past 10 years. Select seminal articles related to the research questions were included based on relevance. Articles that did not address any aspect of the research questions were excluded from review[1].

Children in Haiti

Haiti is a country of 10 million people (World Health Organization, 2012) with half of its population under age 18 (UNICEF, 2012). Haiti is the poorest country in the western hemisphere (World Bank, 2014). Not surprisingly, it has the poorest outcomes for children in this hemisphere as well (UNICEF, 2006). One in every 13 children in Haiti dies before their fifth birthday (UNICEF, 2010). Lack of newborn and infant immunization is a significant factor in child mortality. The immunization rate for children in Haiti is 54%. This immunization rate compares to 90% in the rest of Latin American and 66% in Sub-Saharan Africa (UNICEF, 2006). The other factor that contributes to half of all child deaths is malnutrition (UNUICEF, 2012). Twenty percent of all children in Haiti are underweight. Seventy-five percent of all children are anemic as are half of all pregnant women (UNICEF, 2012).

Families compensate for the high child mortality rate by having large families (UNICEF, 2006). The fertility rate is 4.2 children per woman with many women becoming mothers as teenagers. Nineteen percent of girls under age 17 are mothers. The percentage of teen mothers increases to 31% for young women under age 19 (Faedi,

[1] U.S. Government and UNICEF policy and public information documents were obtained through their websites and included if they contained relevant information.

2008; Justesen & Verner, 2007). Life expectancy is age 62 (World Health Organization, 2012).

Children's education in Haiti is also a concern (UNICEF 2006; 2010; 2012). Twenty percent of all youth are illiterate (UNICEF, 2012). Only 4 out of 10 children attended school (UNICEF, 2010). Of those, only 1% will attend college (UNICEF, 2012).

In addition, there is a concern for the amount of time children dedicate to household chores in Haiti. Faedi (2008) contends that poverty, patriarchal values, and culture account for households' economic reliance on children, especially young girls. Girls as young as 5 years old cook meals, carry water, run errands, and work with their parents in the market. By 7 or 8 years old, girls are caring for siblings and performing a significant amount of household chores (Faedi, 2008).

It is important to note that international agencies have gathered considerable data on children in Haiti through different indicators of physical health, nutrition, and education. However, according to Hoffman (2012) there is a need for anthropological research on children in Haiti so scholars have a multi-dimensional, child centered, culturally informed, perspective on how vulnerability and children's agency work together in everyday life. Hoffman (2012) asserts that there are formidable gaps in the literature that need to be filled in order to understand the lives of vulnerable children in Haiti.

Restavecs. A review of children in Haiti would be incomplete without acknowledging *restavec* children in Haiti. *Restavec* is a Haitian Creole term that literally means 'to stay with' (Nicholas et al., 2012). According to Leeds et al. (2010), the benign definition of *restavec* masks the seriousness of the human rights violations these children

suffer. A *restavec* is a child from an economically poor family that was sold by his/her parents to a wealthier family to provide domestic help. In exchange for the child's domestic help, the wealthier family is supposed to provide the child an education (Leeds et al., 2012; Nichols et al.; 2012; Faedi, 2008; UNICEF, 2006; Janak, 2000).

Most *restavecs* are between the ages of 12 and 17, but some are as young as 5 or 6 (Janak, 2000). Most children come from rural areas to work for wealthy urban families (Janak, 2000). Seventy-five percent of *restavecs* are young girls (UNICEF, 2012; Faedi, 2008; UNICEF, 2006; Janak, 2000). There are an estimated 225 thousand to 300 thousand *restavecs* in Haiti (Leeds et al., 2010; Faedi, 2008; UNICEF, 2006), although suspected underreporting rates would suggest there are closer to 500 thousand *restavec* children in Haiti (Shahinian, 2009).

The widely reported reality is that most *restavecs* receive little to no education and are instead exploited (Leeds et al., 2012; Nichols et al.; 2012; Faedi, 2008; UNICEF, 2006; Janak, 2000; Cadet, 1998). Children are not paid for their services (Leeds et al., 2010; Cadet, 1998); they are overworked and subjected to psychological, physical, and sexual abuse (Nicholas et al., 2012; Leeds et al., 2010; Faedi, 2008; UNICEF 2006; Cadet, 1998). In addition, they do not receive adequate nutrition (Nicholas et al., 2012; Leeds et al., 2010). Most *restavecs* do not receive medical care and have limited contact with a healthy environment (Nicholas et al., 2012). *Restavec* is considered a form of modern child slavery (UNICEF, 2006) as these children have no social or political voice and their only wish is to return home (Janak, 2000).

Orphans. Prior to the January 12, 2010 earthquake in Haiti, there were an estimated 380 thousand orphaned children, i.e. children under age 18 who have lost one

or both parents but are still in family care (Joint Council, 2010). The earthquake caused over 250 thousand deaths and 300 thousand injuries (UNICEF, 2010). International officials currently estimate there are double the number of orphans in Haiti, or approximately 760 thousand (Wylie, 2011). Fifteen thousand of these new orphans are children who lost both of their parents in the earthquake (USAID, 2010). In addition, Haiti has over 50 thousand children living in institutional care who are not included in the country's official orphan statistics (Lindsey, 2010).

Even prior to the January 2010 earthquake, Haiti consistently had the largest percentage of orphans in the child population in the western hemisphere at 15% (UNICEF 2004; 2002). This compares to an average of 6% of orphans in the child population for the Latin American and Caribbean region and 8% of orphans in the child population worldwide (UNICEF, 2004).

Based on the literature, there appear to be gaps in the research on orphans in Haiti. To date, researchers have explored: (a) how children and orphans have been affected by the earthquake disaster (Malow, Rosenberg, Lichtenstein, & Dévieux, 2010); (b) orphans' increased vulnerability for being victims of human trafficking (Smucker & Murray, 2004); (c) orphans living outside of family care who were eligible for humanitarian parole after the 2010 earthquake (Balsari, Lemery, Williams, & Nelson, 2010; Benjamin, Bassily-Marcus, Babu, Silver, & Martin, 2011; Fronek & Cuthbert, 2011; Reitz, 2011; Selman, 2011; Lindsey, 2010). This means additional studies are needed in Haiti to contribute to the literature on orphans, orphan care-giving households, the extent to which risk factors might affect orphans, the extent to which there might be intra-household differences in child treatment based on orphan status, and more.

Intra-household Differences Based on Orphan Status

Intra-household differences in orphans' reported experiences can be an important child welfare issue, as a child's social and environmental context can increase or reduce poor functioning by subjecting children to detrimental experiences; or it can encourage high functioning by increasing children's social support and creating opportunities for positive growth (Fraser, et al. 2004). Twenty-five percent of orphans live in households with co-resident non-orphaned children in places such as South Africa (Ardington & Leibbrandt, 2010). One third of all Haitian households provide care for an orphan or other highly vulnerable child (MSPP, 2013; Gupta & Agrawal, 2010).

Many studies indicate that intra-household differences in child treatment can result in increased orphan vulnerability across multiple categories of risk (Goldberg & Short, 2011; Mmari, 2011; Beegle et al., 2010a; Cluver & Gardner, 2007; Case et al., 2004). Examples of intra-household differences can include divergent resource allocation on key supports like school, school supplies, and clothing (Goldberg & Short, 2011; Cluver & Gardner, 2007; Case et al., 2004). Other examples of possible intra-household differences include inequitable amount of time spent performing household chores, which children have to wash their own clothes, and which children are allowed to sit with adults and other family members during meals (Goldberg & Short, 2011; Beegle et al., 2010b; Cluver & Gardner, 2007).

In addition, there are possible intra-household differences in the messages and emotional climate that orphaned children might experience. Some orphans report being repeatedly called 'the orphan'; others are told that their current household is not 'their home', which makes them feel as though they do not belong (Cluver & Gardner, 2007).

In another study, some orphaned children expressed sadness, loneliness, and a general lack of love and support (Mmari, 2011).

However, it is important to note that some studies have not found evidence of intra-household differences in the treatment of orphans and co-resident non-orphans. For example, Parikh et al. (2007) found no differences in orphans' and co-resident non-orphans' educational attainment, health status, household chores, or child labor in their study in South Africa. The mixed results on intra-household differences illustrate how future research, such as the present exploratory study, should examine orphans' possible differential disadvantage in various categories of risk such as education, health, and domestic work.

Intra-household differences and caregiving motivation. The decision to care for an orphaned child appears to be a complicated and often contentious issue in families, which might affect the treatment of orphans and non-orphans in the same household. The culture, extended family situation, and dynamics in an orphan's family of origin influence the crucial decision that will heighten, maintain, or mitigate an orphan's potential opportunities and risks in the midst of profound grief and loss.

Evidence from Sub-Saharan Africa suggests that the decision tends to be made by the women in the household. In over 70% of the cases, orphan caregivers accepted the responsibility because no one else in the family would care for the child. Orphan caregivers cited love for the orphaned child as their primary motivation for providing care less than 20% of the time (Howard et al., 2006). Nevertheless, the willingness of caregivers to support orphaned children despite poverty might suggest a strong foundation for orphan care (Howard et al., 2006).

The literature review indicated that prospective foster care and adoptive parent training programs in North America include content on assessing orphan and foster child care-giving motivation (North American Council on Adoptable Children, 1998). However, the review did not find an existing orphan care-giving motivation theory that might be utilized to help understand household differences. Nevertheless, the study by Howard et al. (2006) suggests that intra-household differences in reported child treatment based on orphan status may be a culmination of complex familial and cultural factors. The present exploratory study examines the extent to which orphans report intra-household differences in Haiti and what contextual factors might help account for those differences. Although future studies will need to examine the relationship between psychosocial indicators, their effect on orphan care-giving motivation, and outcomes for orphans; the present exploratory study examines how an orphan's relatedness to their head of household might moderate their reported differences in mosquito net usage, education in single years, hours spent fetching water or wood, and hours spent performing domestic household work.

Orphans' Health Vulnerabilities including Mosquito Net Usage

Research from Sub-Saharan Africa and Central Asia suggests that orphans tend to be in poorer health than non-orphans. Orphan health status appears to vary based on the country within these regions, orphan type, and the age at which children lost one or both parents.

For example, evidence indicates that children who lose one or both parents when young tend to have different growth trajectories than if they had not become orphaned. The shock of parental death and/or the subsequent changes in living arrangements, food

security, and other factors affect young children's stature by a few centimeters. This height is not recovered (Beegle et al., 2010b; Hagen, Omar Mahmoud, & Trofimenko, 2010). Children's weight is also adversely affected by becoming an orphan. Orphans are 50% more likely to be underweight than non-orphans (Miller et al., 2007).

Another example of orphan health vulnerability is related to preventative health issues like routine medical check-ups and immunizations. Evidence suggests that orphan caregivers are more likely than non-orphan caregivers to miss their children's routine medical visits or well-child check-ups (Heymann et al., 2007). Routine medical visits are an important aspect of monitoring children's growth and development and preventing future medical issues. Immunizations routinely occur during children's routine medical visits. The literature indicates there are conflicting concerns about orphans' immunization health risks. Evidence from India suggests that most double orphans are unimmunized (Bhattacharya, Rajeshwari, & Saxena, 2010), and data from Kenya suggests orphans living with non-relatives are at increased risk of being unimmunized (Radcliff et al., 2012). However, evidence from Botswana indicates there might be no difference in immunization rates for orphaned children (Miller et al., 2007). The variation about the extent of orphans' preventative health risk needs further investigation.

This exploratory study will assess mosquito net usage as a proxy for malaria prevention, which can reflect a household's investment in a child's health. Mosquito net usage is a relevant issue for Haiti's orphan caregivers given its tropical climate and because many families live in economic poverty and might be affected by the 'malaria trap'. The 'malaria trap' is when families in poverty cannot afford malaria prevention through mosquito nets nor can they afford treatment if malaria is contracted (Blas,

Sommerfeld, & Kurup, 2011). Households caring for orphans and other vulnerable children are a priority for health officials as their malaria burden might be greater.

Malaria prevention through mosquito net usage is an emerging area of scholarship in orphan and vulnerable children's issues. The few studies to date on mosquito net usage on orphan care-giving households did not reveal intra-household differences for orphans and their co-resident non-orphans or between orphans and non-orphans in general (Munaaba et al., 2003; Lindblade, Odhiambo, Rosen, & DeCock, 2003). However, one study did suggest that household size and general poverty are associated with mosquito net usage (Munaaba et al., 2003).

Despite the mixed evidence, malaria prevention for orphans continues to be an area of interest for some scholars and international organizations such as UNICEF (UNICEF, 2013). This might be because preventative health investments are important for orphaned children since orphans tend to be less likely to receive medical treatment when ill for issues such as fever, diarrhea, cough, and malaria in some countries (Munaaba et al., 2003).

Orphans' Educational Risks

The literature shows concern for orphans' potential school performance and educational attainment. Some studies indicate that orphans are at a higher risk of non-enrollment, educational delay, less educational attainment, and not completing primary and secondary school when compared to non-orphans (Beegle et al., 2010a; Hagen et al., 2010; Cluver & Gardner, 2007; Oleke et al., 2007; Yamano et al., 2006; Case et al., 2004). The vulnerabilities appear to be related to children's orphan status and are often

influenced by an orphan's gender, orphan type, household income in their family of origin, and characteristics of their current household.

For example, orphans can be at risk for dropping out of school in some countries. There is evidence that girls in primary school who have lost their fathers and double orphans in secondary school are especially vulnerable (Yamano et al., 2006; Bennell, 2005). It is hypothesized that household resource dilution and other related financial issues might significantly affect a household's ability to pay enrollment fees, cover the cost of uniforms and shoes, pay for school related materials like pens and notebooks, afford transportation to school, have funds for school outings, or pay their past-due tuition by the end of the year so they complete the grade they are attending and continue their studies. The possible moderating effect of household income on orphans' educational performance varies depending on the country of residence, orphan's age, gender, orphan type, and economic status of the family of origin prior to being orphaned (Beegle et al., 2010a; Hagen et al., 2010; Cluver & Gardner, 2007; Oleke et al., 2007; Yamano et al., 2006; Case et al., 2004). However, orphan caregiving households that received external financial supports were almost twice as likely to have orphan children attending school when compared to orphan caregiving households that did not receive financial support (Oleke et al., 2007). In addition to household economic constraints, the risk of dropping out of school is associated with the stigma orphans experience from peers, teachers, and administrators by virtue of being orphans in some countries (Yamano et al., 2006; Bennell, 2005).

Evidence from Sub-Saharan Africa indicates that when controlling for household wealth, orphaned children are less likely to attend school than non-orphaned children,

including co-resident non-orphans in some countries. However, in that study, the presence of orphans in the household does not affect school enrollment for non-orphans in the same household. In that study, orphans are 10% less likely to be enrolled in school, double orphans are 10 to 30% less likely to be enrolled in school when compared to non-orphans in their same household (Case et al., 2004). Some studies also report that orphans are up to 20% more likely to be absent from school. They might also be more likely to repeat grades and be behind grade level for their age (Bennell, 2005; Bicego, Rutstein, & Johnson, 2003). The amount of variation in an orphan's risk for lower education attainment depends on country of residence in Sub-Saharan Africa and orphan type (Parikh et al., 2007; Case et al., 2004).

Thus, there is a need to explore the extent of orphans' educational risks, and possible associations between orphan status and various dimensions of educational vulnerability. These potential associations need further investigation, especially in new contexts like Haiti where less than half of the children nationally are enrolled in school. The Haitian context may provide further information on the intersection of orphan status and household wealth and other contextual factors that might potentially affect household decision making for educational enrollment of orphans and co-resident non-orphans.

Orphans' Domestic Labor

The literature indicates that orphans might be at risk for inequitable distribution of domestic labor when compared to co-resident non-orphans. Familial, economic, social, and cultural factors that affect the division of labor in the household between orphans, their co-resident non-orphans, their caregivers, and other household members might

affect orphans' risk for exploitative or substantial time spent on domestic labor tasks such as general household work, or fetching wood and water (Abebe & Skovdal, 2010).

In countries such as South Africa, all children spend a significant amount of time performing domestic work, with 62% of children fetching water or wood. The time spent performing these chores increases with age (Adato et al., 2005). Nevertheless, several studies report that orphans spent more time performing domestic household chores than their co-resident non-orphans (Betancourt et al.; Goldberg & Short, 2012; Foster et al., 1997). In one study, orphans felt that they could not discuss their unequal treatment with their caregivers (Foster et al.,1997). In other studies, orphans reported either being too tired to attend school due to the amount of time they spent performing domestic household work; or orphans stated that were not able to attend school because of the chores they were expected to perform (Betancourt et al.; Guarcello, Lyon, Rosati, & Valdivia, 2004; Foster et al., 1997).

This literature review suggests that gender might influence which households are willing to care for orphaned children and the amount of domestic work an orphan is expected to perform in their new household. In Sub-Saharan Africa, orphaned girls appear to have an easier time finding a new household of residence because they can perform domestic work such as cleaning, washing up, fetching water or wood, and caring for younger children. On the other hand, orphaned boys are less likely to receive extended family care in urban settings unless he can work as a street vendor outside the home. In rural areas, households engaged with agriculture and livestock are more willing to provide care for orphaned boys as they can help in the fields (Abebe & Skovdal, 2010: Kibombo & Kayabwe, 2009; UNICEF, 2003).

Some evidence suggests orphaned girls whose mothers have died might be at a particular risk since they might need to take their mothers' domestic role in the household (Schenk et al., 2008a; Guarcello et al., 2004). Similarly, orphans who have lost both parents might be at significant risk for substantial domestic labor as they are commonly expected to manage all the chores in their new care-giving household (Guarcello et al., 2004).

In addition, some research suggests orphaned girls are more likely to be withdrawn from school when there is an economic hardship in the family because a girl can fulfill many different roles in the household that would allow others to work for pay outside of the home. Similarly, girls who are not in school can perform domestic work outside of the home to increase their household (PEPFAR, 2008; 2009; 2010). It is important to note that in one study orphan caregivers reported that the orphaned children in their households do not miss school due to domestic household work (Adato, Kadiyala, Roopnaraine, Biermightr-Jenzano, & Norman, 2005).

The earlier literature reports that children in Haiti are engaged in a significant amount of domestic work, especially young girls, regardless of *restavec* status. The literature on orphans and domestic work indicates that orphans may possibly perform a disproportionate amount of domestic chores in their households. This suggests there is a need to explore the extent of intra-household differences in orphans' reported time spent on domestic chores in Haiti.

Household Characteristics

Household wealth. Researchers hypothesize that a portion of intra-household difference in child treatment based on orphan status might be attributed to the effects of

orphans being absorbed into new households with different family resource decision-makers or new household members joining their existing household in the case of sole surviving parents who remarry (Case et al., 2004). Many families cite financial capacity as an important factor in determining into which household an orphan child should be placed (Howard et al., 2006).

The family that incorporates orphaned children into their home typically does so with little to no additional resources and in addition to their own children (PEPFAR, 2007). The new caregivers might also have family members who are ill or are in need of economic support. Even though family care is typically the best option for children (UNICEF Children on the Brink, 2004; UNICEF, Africa's Orphaned Generation, 2006; UNICEF, Enhanced Protection for Children Affected by AIDS, 2007), these family care approaches are not sustainable in many poor communities because caregivers are overwhelmed by the number of children they need to support (PEPFAR, 2008).

Evidence from Sub-Saharan Africa suggests that household resource dilution caused by adding an orphan to an already poor household is a concern (UNICEF, 2006). Some studies report that up to two thirds of orphan care-giving households might experience financial duress because of their orphan care-giving responsibilities. Many households have challenges meeting basic needs (Heymann et al., 2007; Howard et al., 2006). An overcrowded household, no water or electricity, lack of soap/detergent, hair care, and more burdened these households (Cluver & Gardner, 2007).

Household size. Evidence from South Africa suggests that orphan households might be larger in size. The average orphan household in South Africa had 7.54 people of which 4.62 were children (Govender et al., 2012). The dependency ratio of children to

adults and overall household size might contribute to the greater rates of poverty experienced by some orphan care-giving households (Govender et al., 2012; Monasch & Boerma, 2004; UNICEF, 2006).

Head of Household Characteristics: Age and Gender

Many of the research articles reviewed for this study focused on an orphan's adult "caregivers". A significant minority of articles reviewed for this study focused on orphans' "head of household". Although these terms are likely not synonymous, this section of the literature review will include the findings from articles that used either term. The findings illustrate how the age and gender of a significant adult in the household might moderate risk for orphaned children.

The literature review found that orphan care-giving households comprise one in six households in Sub-Saharan Africa (Monasch, & Boerma, 2004). Throughout the literature, orphan caregivers and heads of households are frequently characterized as older women, in declining health, with little education (Monasch & Boerma, 2004; UNICEF, 2006; Beegle et al., 2010a; Drah, 2014). Although studies generally support the gendered nature of orphan caregiving, some evidence suggests that up to 30% of orphans might live in male-headed households (Heymann et al., 2007). Nevertheless, even in male-headed households, women bear the responsibility of orphan care.

The presence of older women in the household though, regardless of head of household status, appears to be a risk-reducing factor for orphans' education. In one study, orphans living in households where female respondents were over age 50 were three times as likely to be enrolled in school when compared to orphans living with female respondents who were under age 30 (Oleke et al., 2007). Hagen et al. (2010) posit

that orphans living in households with older women might receive better care. They suggest that although there is lower household income there is also less opportunity cost when orphans attend school as the older heads of household are already at home performing domestic work.

The literature review also indicates that advanced caregiver age might be a concern. This is because, in many developing countries, there are not pensions for older individuals. Older adults might not be working for pay and are often at risk of economic distress. Studies of grandparent and other adult relative orphan caregivers report a significant proportion of caregivers are around 60 years old, with up to 15% of caregivers being over age 70 (Beegle et al., 2010a; Howard et al., 2006).

Based on studies in Sub-Saharan Africa, this concern is particularly acute when older orphan caregivers are in poor health and have little to no income (Goldberg & Short, 2011; Miller et al., 2007). For example, grandparent caregivers report that old age pensions do not provide enough income to support everyone in the household. This means there might be frequent food shortages and the inability to buy clothing and other basic needs (Hlabyago & Ogunbanjo, 2009; Howard et al., 2006). This evidence suggests that families' ability to care for orphaned children might be compromised when they are overtaxed with care-giving responsibilities due to age and other household factors. Thus, the safety net for children might be stretched too thin to ensure child well-being (UNICEF, 2006).

The literature suggests that further exploration is needed to understand the effects of head of household characteristics on orphans' reported experiences, specifically in comparison to co-resident non-orphans. Advanced head of household age might affect

their ability to perform domestic work which might increase their reliance on orphans and/or co-resident non-orphans to perform household chores. Head of household gender may affect the gender role expectations of orphans and/or co-resident non-orphans that could affect a household's investment in education or the amount of household work a child is expected to perform. For this reason, the present exploratory study will explore the moderating affects of head of household characteristics on orphans' reported experiences with mosquito net usage, years attended school, hours spent fetching water or wood, and hours spent performing domestic household work.

Orphan Characteristics

Orphan age and gender. An orphan's gender and age might also influence which family members will provide care for them and their treatment in the household. Some studies suggest that relatives might be more inclined to care for older boys because of their potential agricultural labor contributions and younger girls because they can perform gendered domestic work (Abebe & Skovdal, 2010; Abebe & Aase, 2007). Other research suggests that girls are at risk for lower educational enrollment and/or attainment (Yamano et al., 2006; Bennell, 2005) and increased risk for performing more domestic chores (PEPFAR, 2008; 2009; 2010).

Orphans' Biological Relatedness to Their Head of Household. Evidence indicates that there are different patterns of orphan caregiving based on the region of the world and a child's orphan type (Thomas, 2012; Monasch & Boerma, 2004). But, extended family members are believed to care for 90% of orphans in Sub-Saharan Africa (Andrews, Skinner, & Zuma, 2006; Monasch & Boerma, 2004; Bicego et al., 2003). When analyzing the moderating variable, an orphan's relationship to the head of

household, the present exploratory study analyzes five different forms of relatedness. The head of household might be the orphan's sole surviving parent, grandparent, other relative, foster/adopted/step parent, or non-relative. As a result, this section of the literature review only includes these five types.

Sole surviving parents. As previously stated, there is variation on who is caring for orphans. This is reflected in the sole-surviving parent orphan caregiving trends in India, South Africa, and several East African nations. For example in India, 86% of orphans are cared for by their sole surviving parent (Bhattachary et al., 2010). In Eastern Africa, between 50 to 70% of orphans live with their sole surviving parent, depending on their orphan type. But in Southern Africa, orphans are more likely to live with other relatives, especially grandparents, than their sole surviving parent (Monasch et al., 2010). Therefore, the assumption that orphans will live with their sole surviving parent might not always be true.

Grandparent-headed households. Grandparent-headed households represent an important and increasingly utilized orphan caregiving household structure (Ardington & Leibbrandt, 2010; Monasch & Boerma, 2004; Bicego, Rutstein et al., 2003). Orphan care in these households tends to be provided by grandmothers, even if grandfathers and other men in the household are present (Nyasani, Sterling & Smith, 2009). The frequency of grandparent-headed orphan caregiving households varies by country and region in Africa. For example, in Botswana and other parts of Sub-Saharan Africa, orphans were three times more likely to live with their grandparents than their sole surviving parent (Beegle et al., 2010a; Miller et al., 2007). Grandparents are the primary caregivers for over half of South Africa's orphans regardless of orphan types (Parikh et al., 2007; Monasch &

Boerma, 2004). But only 24% of orphans are cared for by their grandparents in West Africa, in countries like Cameroon (Monasch & Boerma, 2004).

Research suggests that grandparent-headed households may be a concern because of possible low household income, caregiver's lack of formal education, and caregiver's poor health (Nyasani et al., 2009). Nevertheless, evidence from China indicates that orphans raised by grandparents have consistently better mental health outcomes (Zhao et al., 2010). Thus, there might be strengths that counter the potential deficits associated with grandparent-headed orphan caregiving households.

In fact, grandmothers might be a protective factor for orphans in some domains even though they are more likely to live in poverty and be less educated. For instance, orphans living with their grandmothers are 1.6 times more likely to be enrolled in school when compared to orphans who do not live with their grandmothers (Parker & Short, 2009).

Other relatives & foster/step/adoptive parents. Although their presence is acknowledged in the literature, little is written about other relatives including foster/step/adoptive parents who are orphan caregivers. Other relatives might be aunts or uncles, adult siblings, relatives through marriage, or adult cousins. The literature reviewed for this study indicates almost 7% of orphaned children received care from their older adult siblings in Kenya (Nyambedha, Wandibba, & Aagaard-Hansen, 2003). Other evidence, such as a study of working orphan caregivers in Botswana, indicated that over 50% of the households in the study were caring for nieces or nephews (Heymann et al., 2007). These "other" types of family relationships are mixed together in research study

findings, making it difficult to infer much information about these groups of caregivers and the outcomes for orphans in their care.

Non-relative caregivers. Non-relative caregivers might be fictive kin or other individuals in the community who are willing to informally care for orphaned children. In terms of prevalence, research from Kenya and South Africa contends that double orphans are more likely than single orphans to live with non-relative caregivers (Freeman & Nkomo, 2006; Nyambedha et al., 2003). In countries such as Kenya, 12% of double orphans live in this type of household (Nyambedha et al., 2003).

Evidence suggests that double orphans and single orphans who do not live in relative households might experience discrimination in multiple domains of investment including education (Beegle et al., 2010a). Researchers hypothesize that the degree of relatedness and its corresponding level of investment might explain poorer school performance outcomes for many orphans (Case et al., 2004).

There are significant orphan vulnerability concerns for children who live in non-relative households. According to one study, this structure might pose unique risks to orphan well-being as children are frequently expected to be herdsman, errand-boys, or housemaids as a condition of their stay (Freeman & Nkomo, 2006). Indeed, evidence from China supports this category of concern. Data suggests that orphans raised in non-relative households had the worst mental health outcomes for depression, loneliness, and trauma than any other orphan household care-giving structure (Zhao et al., 2010).

In conclusion, this chapter reviewed essential background on the eight different aspects of the present study: (a) children in Haiti; (b) intra-household differences based on orphan status; (c) orphan health including malaria prevention through mosquito net

usage; (d) orphan education; (e) orphan participation in domestic child labor; (f) household characteristics such as household wealth and household size; (g) head of household characteristics including head of household age and gender; (h) orphan child characteristics such as orphan gender, and an orphan's relationship to their head of household. Overall, orphans' risk factors appear to be affected by country of study, orphan type, and an orphan's relatedness to their head of household.

First, the literature indicates that many children in Haiti experience challenges in access to education and health. Girls appear to be expected to provide a disproportionate amount of domestic household labor. Child servitude exists in Haiti and maintains a system of disadvantage for that group of children. In addition, many Haitian children are orphaned since Haiti has the highest percentage of orphans in the child population in the Western Hemisphere (UNICEF, 2004).

Second, the literature indicates that in some countries orphaned children might experience intra-household differences in child treatment when compared to their co-resident non-orphan. The literature suggests that orphaned children might experience poorer health across several dimensions in comparison to non-orphaned children. Country of study, household size, and household wealth appear to affect the extent and type of health vulnerability.

Third, the literature review summarizes the contrasting evidence on how orphans may experience differential disadvantage for health care including mosquito net usage. Fourth, the literature highlights the mixed evidence on educational outcomes for orphaned children. Educational outcomes appear to vary by country, orphan type, orphan age, orphan gender, household income in their family of origin, and characteristics in

their current household. Fifth, the literature highlights how orphans are less likely to be enrolled in school than their co-resident non-orphans in some countries. Based on these studies, orphaned girls might be at a particular disadvantage for educational enrollment and/or attainment in families with few economic resources or families that experience a hardship.

Sixth, the literature review suggests that household wealth might contribute to intra-household differences in child treatment. In addition, households that were already experiencing poverty prior to an orphan joining the household might significantly moderate an orphan's risk in different domains. Likewise, household size might be associated with poverty and might moderate risks for orphaned children.

Seventh, the literature review suggests that gender and advanced head of household age are associated with both risk factors and protective factors for orphaned children. In the eighth and final section, the literature review indicates that an orphaned child's relationship to their head of household might be a moderating factor for vulnerability. Orphaned children living with their sole surviving parent might be less prevalent than previously believed in some countries. Grandparent-headed households are more frequent in some countries than others. Grandparent-headed households are associated with various risk factors and protective factors. There is little mention of other relative caregivers in the literature, and there are potential risk factors associated with non-relative caregivers.

Taken together, the literature illustrates how Haiti provides an appropriate context for research on the extent of intra-household differences in orphans' reported experiences for mosquito net usage, years attended school, hours spent fetching water or wood, and

hours spent performing domestic household work. The interest of UNICEF (2013) and the work of Blas et al. (2011) and Munaaba et al. (2003) suggest there is a need for additional exploratory research into mosquito net usage for orphans as compared to co-resident non-orphans. The research by Beegle et al. (2010a), Hagen et al. (2010), Cluver and Gardner (2007), Oleke et al. (2007), Yamano et al. (2006), and Case et al., (2004) indicate that there might be a relationship between orphan status, educational outcomes for orphans, household characteristics, head of household characteristics, and orphan characteristics that needs further exploration in order to develop stronger policies and practices that support orphans and their families where merited. Moreover, research on domestic household chores by Betancourt et al. (2012), Goldberg and Short (2012), and Foster et al. (1997) indicate that there are potential differences in the amount of time orphans and non-orphans spend on domestic household chores. However, more research on how household characteristics, head of household characteristics, and orphan characteristics might affect these differences is needed. For this reason, the present exploratory study assesses if the Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans treat children differently based on their orphan status. It seeks to understand if, and to what extent, orphan care-giving family characteristics such as household, head of household, and child characteristics moderate intra-household experiences between orphans and co-resident non-orphans to impact orphans' mosquito net usage, years reported attending school, hours spent fetching water or wood, and hours spent performing domestic household work.

Chapter Three: Methods, Research Design and Approach

This exploratory study aims to assess if the Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans treat children differently based on their orphan status. It seeks to understand if, and to what extent, orphan care-giving family characteristics such as household, head of household, and child characteristics moderate intra-household experiences between orphans and co-resident non-orphans to impact orphans reported mosquito net usage, education in single years, hours spent fetching water or wood, and hours spent performing domestic household work. To accomplish the study's goals, the researcher conducted secondary data analysis of the 2012 Demographic Health Survey (DHS) in Haiti. This section of the paper explains the research questions and hypotheses, provides background on the data set, discusses the exploratory data analysis conducted on the dataset, explains decisions made regarding missing data and the treatment of outliers, describes the sample household and individual characteristics, reviews the variables analyzed, and summarizes the statistical method of analysis.

Research Questions and Hypotheses

1. In Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans, to what extent are intra-household differences between orphans or co-resident non-orphans reported for mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

   H1: In Haitian households that care for elementary and middle school aged orphans and co-resident non-orphans, being an orphan or co-resident non-orphan is significantly associated with intra-household differences in reported mosquito

net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work.

2. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

   H2: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household size significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work.

   H3: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household wealth significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work.

3. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do head of household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

   H4: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, head of household age significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work.

   H5: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, head of household gender significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work.

4. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan characteristics moderate intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

   H6: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, orphan gender significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work.

   H7. In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, orphans' relatedness of their head of household significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work.

5. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan care-giving family characteristics (such as household, head of household, and orphan characteristics) predict intra-household differences in reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

   H8: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported mosquito net usage.

   H9: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported education in single years.

H10: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported hours spent fetching water or wood.

H11: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported hours spent performing domestic household chores.

Data Source

The Demographic Health Survey (DHS) is a survey developed and funded by the United States Agency for International Development (USAID). USAID administers the survey in over 90 countries that have received international assistance since 1984. On average, the survey is administered every 5 years. The core DHS survey is consistent across countries to allow for comparisons, although countries can add questions to examine locally relevant issues. The core survey consists of a household questionnaire for all individuals in the household, plus additional survey questions for adult women, adult men, children under age 5, and children aged 5 to 14 (DHS, 2014). DHS collaborates with a ministry/cabinet/department in the foreign government or a non-governmental organization in that country to conduct the survey in each country. Data is collected from randomly selected households during a 9 to 12 month period. Everyone in the selected household is surveyed unless they refused to participate. Interviewers might have to visit the household on more than one occasion to collect data on every household member (DHS, 2014).

DHS provided the researcher six versions of the Haiti 2012 dataset that all contained individual level responses to facilitate different types of analysis (DHS, personal communication, June 17, 2014). This study conducted its analysis from the

"Household Recode" version of the dataset in order to analyze household level data on orphans, their co-resident non-orphans, and their mutual head of household.

Exploratory Data Analysis

Exploratory data analysis was conducted to (a) review the data set; (b) investigate potential problems with the data such as outliers and missing values; (c) explore the relationships between variables to ascertain how to appropriately test the proposed study's multiple hypotheses; (d) assess whether assumptions were met for the type of statistical analysis considered. These four exploratory steps are aligned with Leech, Barrett and Morgan's (2005) guidance on exploratory data analysis.

Descriptive statistics. Descriptive statistics were performed to explore the data. Frequencies (see Appendix A), histograms (see Appendix B), Spearman's Rho Correlation Analysis (see Appendix C), Q-Q plots (see Appendix D) and Scatterplots (see Appendix E) were conducted. The Independent Samples T-test on orphan and non-orphan age was performed. The results indicated that the orphan and non-orphan age difference was statistically significant (see Appendix F). Therefore, the present study controlled for orphan age by including this variable in all multivariate and univariate models. Tests for assumptions will be discussed later in this chapter.

Treatment of outliers. Based on the exploratory analysis using descriptive statistics and the literature on intra-household differences, the researcher decided not to treat outliers based on the raw scores. The treatment of outliers in household difference scores will be discussed later in this chapter.

Missing Data. Missing data followed a random pattern. Cases with missing data were excluded from specific analysis, i.e. listwise deletion (Field, 2005; Alison, 2001).

Hypothesis testing analyses exploration. The purpose of hypothesis testing analysis exploration was two-fold. First, hypothesis testing analysis exploration was conducted to ensure that data could be appropriately conducted at the household level. Second, hypothesis testing analysis exploration was conducted to assess the adequacy of different analytical methods for the research questions. Through this process, various methods of statistical analysis were explored; and some were not chosen because they were not a good fit for the research questions. Details of this exploration process follow below.

First, Hierarchical Linear Modeling (HLM) was considered as it is a nested model. HLM requires numerous individuals within each group and is commonly used for multiple levels of nesting (Kutner, Nachtsheim, Neter & Li, 2005). In contrast, the proposed study's research questions require only one level of nesting (i.e. household) and have few individuals within each group. The issue of small group size made hierarchical linear modeling an inappropriate choice for the present study.

Second, Structural Equation Modeling (SEM) was considered as a method to nest data at the household level. However, SEM is best used when significant research has been conducted on a topic and a researcher is ready to evaluate model fit (Pedhazur & Pedhzaur Schmelkin, 1991). Intra-household differences in the treatment of orphans and co-resident non-orphans are an emerging area of scholarship. Because to the exploratory nature of this study, evaluating model fit using SEM was not pursued as it is beyond the scope of this study.

Third, analyzing data at the household level through purposive matching of an orphan and their co-resident non-orphan to create a household difference score for each

category of children was explored. This creates household level pairings that permit the assessment of within group differences through Matched Pairs T-tests (MacDonald, 2014). It also facilitates Multivariate Analysis of Covariance (MANCOVA) and Univariate Analysis of Covariance (ANCOVA) modeling the pairs mean difference to assess between group differences. Matched Pairs T-tests, MANCOVA, and ANCOVA, based on the differences scores, were the chosen analysis for the research questions. Therefore, purposive matching of the most similar orphans and non-orphans in the same household to create a household score was utilized for the study. Specific information on the matching protocol is detailed in the following section. Details on the methods of analysis are later in this chapter.

Household Level Analysis

The study's focus on intra-household differences in the treatment of orphans and their co-resident non-orphans requires analyzing the data at the household level. As mentioned earlier, this research study utilized purposive matching of an orphan and a co-resident non-orphan to create a household difference score based on the response difference to each dependent variable for the orphan and co-resident non-orphan. This method also allowed children who are most similar to be compared to each other to assess for within and between group differences.

It is important to note that there are almost 1.5 elementary and middle school-aged co-resident non-orphans for every one elementary and middle school-aged orphan in Haitian households that participated in the 2012 DHS survey. The imbalance in orphans to co-resident non-orphans would violate the assumption of independence that is required for various types of analysis for this study, such as MANCOVA (Field, 2005). However,

purposive matching of orphans and their co-resident non-orphans at the household level eliminates the dependency issue.

Protocol for matching. To be able to analyze data at the household level, child data was matched. From the household level matches, a composite was created for each dependent variable based on the calculation of the difference of the two selected children (i.e. one orphan and one co-resident non-orphan). Households with only one orphan and only one co-resident non-orphan used the existing data for each child to calculate the household mean difference score. Households with varying numbers of orphans and co-resident non-orphans utilized a purposive matching process based first on gender and second by age, in order to match the orphan with the most similar co-resident non-orphan. In these cases, the household difference score for the orphan and co-resident non-orphan was derived from the selected orphan and co-resident non-orphan child in the household.

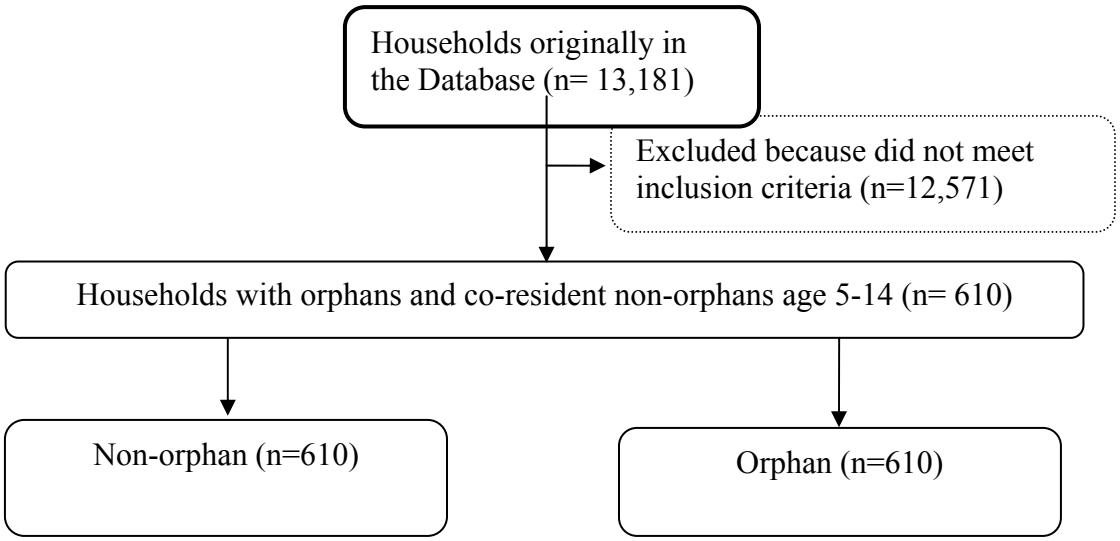
In cases where more than one co-resident non-orphan was a perfect match for the orphaned child in terms of both gender and age, a coin was flipped to determine which co-resident non-orphaned child's data was used to calculate the household difference score. This same process was used in cases where there was more than one orphan in the household and/or more than one co-resident non-orphan. A coin was flipped 11 times to determine which child's data would be used in a household match. The matching process was verified by a Research Associate at the University of Minnesota Extension Center for Family Development before the final analysis was conducted. See Table 1 for comparison of orphan and co-resident non-orphan characteristics before and after

matching at the household level. This table also illustrates some descriptive differences between orphans and co-resident non-orphans after matching.

Sample

The sample selected is from the 2012 DHS household survey of children and adults from Haiti. The full survey was administered to 13,181 households (DHS, 2014). For the present study, the sample selection criteria was: (a) that the household had one or more resident children between the ages of 5 and 14 who had lost one or both parents (i.e. an orphan); (b) a co-resident non-orphan within the same age range. The total sample that met study criteria included 610 households (see Figure 1). Households with an orphan or a co-resident non-orphan outside of the 5 to 14 age range were excluded from the study. Households with orphans and co-resident non-orphans who were visitors, but not residents, were also excluded.

FIGURE 1: *PARTICIPANT SELECTION FLOW DIAGRAM*



Household characteristics. Household income was fairly equally distributed in the sample. The wealth index ranks families as poorest, poorer, middle, richer, and richest as compared to the national average in Haiti. Almost 24% of households in the study were considered the poorest households. Twenty-two percent of households were considered poorer. Twenty-one percent of households were considered middle. Eighteen percent of households were considered richer and 15% of households were considered richest (see Appendix G). Household size ranged between 3 and 26 people per household with the average household containing 7.2 members (see Appendix H).

Head of household characteristics. In households that met the inclusion criterion for the study, 52% of heads of households were male and 48% of heads of household were female (see Appendix I). Head of household age ranged from 19 to 86 years old. The mean head of household age was 48 years old with a standard deviation of 14.4 years (see Appendix I, Table I2).

Child characteristics. Before matching, the sample contained 1777 children aged 5 to 14, of which 763 were orphans and 1014 were co-resident non-orphans. After matching, the sample contained 610 orphans and 610 co-resident non-orphans, or 1220 total children in 610 households. After matching, 49% of orphans were male, and 51% of orphans were female. Fifty-one percent of co-resident non-orphans were female and 49% were male. The mean age of orphans was 10.69 years old. The mean age of co-resident non-orphans was 9.16 years old. The older average age of orphans is consistent with study findings conducted by UNICEF across the globe that show orphans tend to be older children (UNICEF, 2004). See Table 1 for a summary of the sample differences for children before and after matching.

TABLE 1: *COMPARISON OF ORPHAN AND CO-RESIDENT NON-ORPHAN CHARACTERISTICS BEFORE AND AFTER MATCHING DATA AT THE HOUSEHOLD LEVEL*

Variable	Orphans	Co-resident non-orphans
Before Matching N=1777 children	*763*	*1014*
Gender		
Male	384 (50.3)	510 (50.3)
Female	379 (49.7)	504 (49.7)
Age Mean (SD)	10.55 (2.6)	9.12 (2.9)
How orphan's related to head of household		
Not related	62 (8.1)	26 (2.6)
Adopted/foster child/stepchild	93 (12.2)	49 (4.8)
Brother/sister & other Relatives	249 (32.6)	152 (15.0)
Grandchild	163 (21.4)	247 (24.4)
Son/daughter	189 (24.8)	530 (52.3)
After Matching N=1220 children	*610*	*610*
Gender		
Male	298 (48.9)	313 (51.3)
Female	312 (51.1)	297 (48.7)
Age Mean (SD)	10.69 (2.5)	9.16 (2.7)
How orphan's related to head of household		
Not related	58 (9.6)	17 (2.8)
Adopted/foster child/stepchild	78 (12.9)	31(5.1)
Brother/sister & other Relatives	204 (33.7)	94 (15.6)
Grandchild	121 (20.0)	143 (23.7)
Son/daughter	145 (23.9)	319 (52.8)

Note. SD- Standard deviation

Instrumentation/Measures

This exploratory study aims to assess if the Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans treat children differently based on their orphan status. It seeks to understand if, and to what extent, orphan care-giving family characteristics (such as household, head of household, and

child characteristics) moderate intra-household experiences between orphans and co-resident non-orphans to impact orphans' mosquito net usage, years reported attending school, and division of labor in two types of domestic work. The study included the household survey questions that are adult reports of *head of household* and *household characteristics*, and *mosquito net usage by child*. The survey items on *years attended school,* and *hours spent on two types of domestic tasks* are child reports from the section of the survey for children aged 5 to 14 years old.

Orphan Status. Orphan status was determined by selecting individual cases where respondents were between 5 and 14 years of age, were single or double orphans, and were considered a resident of the household. Orphan status was subsequently dummy coded as a variable.

Decision rule when orphan status was unknown. It is important to note that in the 2012 DHS Haiti study, there were 59 children out of 14,473 children aged 5 to 14 whose adult respondents did not know if one or both of the child's biological parents were alive. If the respondent did not know if both parents were alive, the child was coded as an orphan because they fall under the category of social orphan (WorldBank, 2005). If respondents knew that one parent was deceased, but did not know about the other parent, the child was coded as an orphan because they meet the definition of a single orphan. If the respondent knew that one parent was alive but did not know the status of the other parent, the child was coded as an orphan because they met the definition of a social orphan (WorldBank, 2005). This group of child cases was re-categorized as orphans. See Table 2 for further information about the frequency of these cases.

After ensuring that every child was coded properly, only households containing orphans and co-resident non-orphans between the ages of 5 and14 years old were selected. This greatly reduced the number of households in the study, as many households were not caring for orphans. In addition, some households are caring for orphans and co-resident non-orphans but the children are below or above this age range. Households that did not meet the orphan and co-resident non-orphan, child age, and resident status criterion were excluded from analysis.

TABLE 2: *CROSS-TABULATION OF CASES BEFORE MATCHING WHERE RESPONDENTS DID NOT KNOW IF A CHILD'S MOTHER OR FATHER WAS ALIVE SO DATA WAS RE-CODED*

			Father alive			*Total*
			No	*Yes*	*Don't know*	
Mother alive	No	Count	206	503	7	716
		Mother alive	28.8%	70.3%	1.0%	100.0%
		Father alive	14.5%	3.9%	14.6%	4.9%
	Yes	Count	1214	12494	38	13746
		Mother alive	8.8%	90.9%	0.3%	100.0%
		Father alive	85.4%	96.1%	79.2%	95.0%
	Don't know	Count	2	6	3	**11**
		Mother alive	18.2%	54.5%	27.3%	100.0%
		Father alive	0.1%	0.0%	6.3%	0.1%
Total		Count	1422	13003	**48**	14473
		Mother alive	9.8%	89.8%	0.3%	100.0%
		Father alive	100.0%	100.0%	100.0%	100.0%

Dependent variables. This study analyzed four dependent variables and their association with intra-household differences for orphans and co-resident non-orphans. The dependent variables are reported mosquito net usage, education in single years including the present year, hours spent fetching water or wood in the past week, and the hours spent performing domestic household work in the past week.

Mosquito net usage. This study utilized DHS question HML12 for mosquito net usage. The item is "what type of mosquito net did you sleep under last night?". If the respondent did not sleep under a mosquito net last night the negative response will be maintained and kept the zero code. Respondent could answer that they slept under a treated net, untreated net, or a combination of treated and untreated nets last night. All three affirmative responses were consolidated into a dummy variable that affirms they slept under a mosquito net last night. The affirmative response was coded as one. Mosquito net usage is recommended year-round in Haiti (CDC, 2014) so the responses to this question should not be affected by seasonality.

Education in single years. This study utilized DHS survey question HV124. It asks education in single years including the current school year. Current year means the 2012 calendar year, which was the survey timeframe. The response option is a discrete scale from zero on up.

Education in single years including current was the best option when compared to other educational status questions in the dataset. For example, another education question, HV109, asks about educational attainment. The response categories include scaled options such as incomplete primary, complete primary, incomplete secondary, and complete secondary. Given the children in this study were elementary and middle school age, this survey question was not selected as there were few response categories which limits the analysis and potential interpretations of the data.

Another education question, HV110, asks if the individual is still in school. It has binary response categories, which limits the analysis and potential interpretations of the data. Similarly, HV122 asks about educational level including current school year. Scaled

response options included primary, intermediate, and secondary. This survey question was not selected as there were few response categories, which limits the analysis and potential interpretations of the data.

Questions such as HV123 ask the current grade in school including current school year. The response to this question is a discrete variable in whole numbers starting at one. This survey question was not chosen for analysis because current grade in school could be affected by extraneous factors (such as school performance) which controlling for would be beyond the scope of this study.

Therefore, present study chose to analyze survey question HV124 that asks education in single years including the current school year. The present study aims to assess intra-household differences in the household's continued investment of orphan and co-resident non-orphan education regardless of school performance.

Hours spent fetching water or wood. Survey question CHL04 is a variable with a continuous response option reflecting the number of hours the respondent spent fetching water or wood for their household of residence in the past week. Fetching water or wood is a year-round activity. Wood is used as a fuel source for cooking (UNICEF, 2006). Water is fetched because almost half of Haitian households lack running water (UNICEF, 2006).

Hours spent performing domestic household work. Survey question CHL08 is a continuous variable that indicates the number of hours a child has spent on domestic household work in their household of residence in the past week.

Theoretically, this variable does not include hours spent working for a household member's business as CHL06 inquired about this category of work. Likewise, this

variable should not include hours spent performing domestic work in a household that is not their household of residence as CHL02 inquired about that category of work. CHL02 and CHL06 were excluded from the present study due to missing data. Therefore, CHL08, that asks the number of hours a child has spent on domestic household work in their household of residence, will be included.

Moderating Variables

This study explored the effects of household characteristics, head of household characteristics, and orphan characteristics as possible moderators of intra-household differences in reported mosquito net usage, education in single years, hours spent fetching water or wood, and hours spent performing household chores. In this study, a moderating variable was defined as a specific variable that "affects the direction and/or strength of the relation between the independent or predictor variable and the dependent or criterion" (Baron & Kenny, 1986, p. 1174). Moderating variables can be categorical or continuous. They can be stable characteristics of an individual such as gender, age, race, ethnicity; individual characteristics at the time of study such as socio-economic status; or environmental factors such geographic location (MacKinnon, 2011). Six moderating variables that fall into three categories were explored in the study. The categories are household characteristics, head of household characteristics, and orphan characteristics.

Household characteristics. This study explores household characteristics as potential moderators of intra-household differences in reported mosquito net usage, years attended school, hours spent fetching water or wood, and hours spent performing domestic household chores. Specifically, this study utilized a continuous variable originally coded as survey question HV009 that asks the number of household members.

Household wealth was measured by survey question HV270. HV270 is the household wealth index. Response options included 1 to 5: category 1 is poorest, category 2 is poorer, category 3 is middle, category 4 is richer, and category 5 is richest. These 5 scaled responses were developed from question HV271. HV271 is the raw composite score of household wealth as derived from adding household income and assets from various other survey questions (Rutstein, Staveteig, & Measure, 2014). To adjust for differences in rural and urban household assets and income, DHS uses different survey questions when computing household wealth scores in rural and urban areas (Rutstein et al., 2014). For example, in an urban area running water in the household might be one of many indicators of wealth that is used to compute a household's raw wealth score. However, in a rural area where no one has running water, DHS would select another household infrastructure question that represents rural wealth, in place of the running water question that is used to compute household wealth in urban areas.

After DHS computes the composite raw scores for individual households based on the appropriate variables for rural and urban areas, they compute the quintiles for rural households and the quintiles for urban households. Then, each household was coded on a scale of 1 to 5 for their respective rural or urban environment. The scores from the rural and urban quintiles were combined to form question HV270 (Rutstein et al., 2014). The current study utilized the household wealth index question HV270, instead of the continuous household wealth variable from HV271, in order to account for rural and urban differences in household wealth.

Head of household characteristics. The study explores head of household characteristics as possible moderators of intra-household differences in reported mosquito

net usage, years attended school, hours spent fetching water or wood, and hours spent performing domestic household chores. Head of household age as a potential moderator was explored using survey question HV220. Head of household age is a continuous variable. Head of household gender as a potential moderator was explored using survey question HV219. It has binary response options. Male respondents are coded as 1. Female respondents are coded as 2.

Orphan characteristics. The study also explores orphan characteristics as possible moderators of intra-household differences in reported mosquito net usage, years attended school, hours spent fetching water or wood, and hours spent performing domestic household chores. Specifically, it explored orphan gender and an orphan's relatedness to their head of household. The possible moderating affects of child gender were assessed through question HV105. In this question, male respondents are coded as 1. Female respondents are coded as 2.

Child's relationship to head of household was determined using the pre-existing relationship categories in question HV101, "Relationship to Head of Household." The pre-existing relationship to head of household categories was maintained for *parent, grandchild,* and *not related*. The adopted/foster/step-child category was also maintained included in the current study even though Haiti does not have a functional domestic adoption or formal foster care program (Joint Council, 2011). The response categories of *brother/sister, niece/nephew by blood or marriage,* and *aunt/uncle/other relative* were collapsed into another category called *other relative*. The existing ordinal structure for these relationship categories was modified to accommodate the five consolidated relationship types and place the numbers in sequential order based on the closeness of the

relationship. Parent was recoded to be a 5, grandparents a 4, other relative a 3, adopted/foster/step child a 2, and non-relative a 1.

Child age is survey question HV105, a continuous variable. This study controlled for age by using the age of the orphaned child. The present study chose to control for age because age can be an extraneous variable that would affect the dependent variables in analysis (Vogt, 1999).

Data Analysis

Statistical analysis software. The Demographic Health Survey recommends analyzing the data in SPSS, STATA, or SAS. This study will analyze the data using SPSS version 21.0. Descriptive analysis such as frequencies, crosstabs, and histograms were conducted to further explore the data. Pearson's product-Moment Correlation Analysis was also performed to explore the data.

Analysis. To answer the hypothesis of the present study, the researcher conducted Matched Pairs T-tests and Multivariate Analysis of Covariance (MANCOVA) with Univariate Analysis of Covariance (ANCOVA). A brief explanation of these analytical methods and their assumptions follow.

Matched Pairs T-test. The matched-pairs t-test is a parametric test that is also known as the *dependent means t-test* and the *paired-samples t-test*. It is frequently utilized to assess mean differences for individuals' pre- and post-experimental condition scores (Field, 2005). For the present study, it is the appropriate mean difference test because of the study's focus on intra-household differences between an orphan and a co-resident non-orphan. In the present exploratory study, the household is the unit of analysis instead of an individual. The two children in the same household are a pair and

the mean difference was modeled as dependent variable scores in the subsequent analysis. The orphan and co-resident non-orphan selected for study in each household form the pair because the matching protocol matches the most similar orphan and co-resident non-orphan together for analysis. They are also a matched-pair because they live in the same household with the same theoretical conditions.

There are two assumptions for a matched-pairs t-test according to Field (2005). The first assumption is that data are from normally distributed populations. The second assumption is that "data is measured at least at the interval level" (Field, 2005, p. 297).

Multivariate Analysis of Covariance (MANCOVA). MANCOVA is the analysis of covariance used when there are multiple dependent variables such as reported mosquito net usage, education in single years, hours spent fetching water or wood, and hours spent performing domestic work. MANCOVA was used because this study assessed how covariates moderated multiple dependent variables (Field, 2005). MANCOVA is preferred when there is an empirical basis or sound theoretical reason to include variables in the model (Field, 2005). MANCOVA also has four assumptions that should be met. They are (a) multivariate normality; (b) independence of observations; (c) homogeneity of variances; (d) homogeneity of covariance. However, the assumption of homogeneity of covariance does not apply to the present study, as there is no factor being analyzed, only dependent variables and covariates. The assumption of independent observations was met as DHS randomly sampled Haitian households in 2012 (DHS, 2012).

MANCOVA is robust to violations of normality, homogeneity of variance, and homogeneity of covariance if group sizes are approximately equal (Leech et al., 2005). It

is important to note that the present study does not have groups since orphan and co-resident non-orphan survey responses were matched, and a difference score was created from their responses. The paper will discuss the assumptions of multivariate normality and homogeneity of variances in the next sub-section.

There are 4 different test statistics for MANCOVA: Roy's statistic, Hotelling's trace, Wilk's lambda, and Pillai's trace. This study used Pillai's trace. More information on why Pillai's trace was chosen can be found in the next section of this paper. Follow-up ANCOVAs were analyzed for all dependent variables that were significant in the MANCOVA analysis. ANCOVA has many of the same assumptions as MANCOVA. Post hoc tests in MANCOVA and ANCOVA require three or more levels to be conducted. Since the present study had one level, additional post hoc tests could not be performed (Tabachnick & Fidell, 2007).

Statistical Analysis Method

1. **In Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans, to what extent are intra-household differences between orphans or co-resident non-orphans reported for mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?** A matched-pairs t-test was conducted to assess intra-household differences in the reported dependent variable responses for the selected orphan and co-resident non-orphan in the household. Statistically significant mean differences indicate there are intra-household differences in child treatment for orphans and co-resident non-orphans that merit further exploration.

After the matched pairs t-test, the household difference scores for orphans and co-resident non-orphans were calculated for each reported dependent variable response. Four new variables were created because of this process: difference in mosquito net usage, difference in years of school attended, difference in hours spent on fetching water or wood, and difference in hours spent performing domestic household work. These 4 variables (herein called difference score dependent variables) were the basis for the subsequent analysis.

Outliers in difference score dependent variables. Outliers for the difference score dependent variables were visually assessed using histograms and boxplots. The results indicated that one household had an orphan and a non-orphan who were both twelve-year-old females. Both had similar reported experiences with mosquito net usage, single years attended school, and hours spent performing domestic household work. However, the orphan in the household reported spending 40 hours a week fetching water or wood. This compared to the non-orphan spending 4 hours per week on the same type chore. The difference in hours spent fetching water or wood for the two girls was 36 hours. This represented an extreme outlier that could skew further analysis. Therefore, the reported hours spent fetching water or wood for these two girls was re-coded to be missing values that would be excluded from the analysis through listwise deletion.

Tests for assumptions on difference score dependent variables. The appropriate statistical method for research questions two through five requires the difference score dependent variables. To detect normality visually, Q-Q plots (see

Appendix L) and Scatterplots (see Appendix M) were conducted on the difference score dependent variables.

The scatterplots for difference in years of education, difference in hours spent fetching water or wood, and difference in hours spent performing domestic household chores indicate that there are no obvious outliers as most points fall in the vicinity of other points. The scatterplots that include difference in mosquito net usage show a strong central line and a few parallel points on a both sides. This is because mosquito net usage is a binary response variable where 0 equaled no and 1 equaled yes. The parallel points on either side reflect the small number of cases where there was an intra-household difference in mosquito net usage.

The Q-Q Plot for difference in mosquito net usage indicates that the observed values for difference in mosquito net usage deviate from the expected values. This indicates the observed values for this variable are not normally distributed. The Q-Q Plots for difference in years of school attended shows the observed values are closely aligned to the expected values. This would suggest the observed values might be normally distributed. The Q-Q Plots of difference in hours spent fetching water or wood, and hours spent performing domestic household work show the observed value sagging below and rising above the expected values. This indicates that the observed variables are not normally distributed for these two indicators.

The Kolmogorov-Smirnov test for normality was conducted to assess if the difference score dependent variables in the study were normally distributed (Field, 2005). The Kolmogorov-Smirnov test for normality is actually a univariate test for normality and not sufficient to ensure multivariate normality. If the results of the

Kolmogorov-Smirnov test indicate the data is not univariate normal, the data cannot be multivariate normal (Ernest Davenport, personal communication, December 12, 2014). The Kolmogorov-Smirnov indicated that the assumption of univariate normality were not met for all four difference score dependent variables, $p < .001$ (see Appendix N). Therefore, the difference score dependent variables do not meet the assumption of multivariate normality. The histograms indicated that the data is not skewed, but rather has high peaks at the center of the distribution that affect the assumption of normality (Appendix B9, B10, B11, and B12).

The present study could not conduct Levene's test for homogeneity of variance since it does not have an independent variable or fixed factor (Ernest Davenport, personal communication, October 15, 2014). The present study did not meet the assumption for multivariate normality and could not test for the assumption of homogeneity of variance. Given the exploratory nature of the current study, the researcher proceeded with caution due to the limitations of the data.

This study used Pillai's trace MANCOVA test statistic. Pillai's trace is the best test statistics when the assumption of homogeneity of covariance is not met and group sizes are similar (Leech et al., 2005). It is important to note that any of the 4 MANCOVA test statistics could be used with the present study since it does not have a complex design (Ernest Davenport, personal communication, October 15, 2014).

2. **In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water**

or wood, and time spent performing domestic household work? MANCOVA was conducted to assess if the difference score dependent variables are moderated by household wealth. Similarly, MANCOVA was conducted to assess if the difference score dependent variables are moderated by household size. ANCOVA output was analyzed when there was a statistically significant finding in the MANCOVA model. All models included orphan age to account for age differences between orphans and co-resident non-orphans.

3. **In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do head of household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?** MANCOVA was conducted to assess if the difference score dependent variables are moderated by head of household age. Similarly, MANCOVA was conducted to assess if the difference score dependent variables are moderated by head of household gender. ANCOVA output was analyzed when there was a statistically significant finding in the MANCOVA model. All models included orphan age to account for age differences between orphans and co-resident non-orphans.
4. **In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan characteristics moderate intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?** MANCOVA was conducted to assess

if the difference score dependent variables are moderated by orphan gender. Similarly, MANCOVA was conducted to assess if the difference score dependent variables are moderated by an orphan's relatedness to their head of household. ANCOVA output was analyzed when there was a statistically significant finding in the MANCOVA model. All models included orphan age to account for age differences between orphans and co-resident non-orphans.

5. **In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan care-giving family characteristics (such as household, head of household, and orphan characteristics) interact to predict intra-household differences in reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?** ANCOVA was conducted for each separate different score dependent variable using the six moderating variables (household wealth, household size, head of household age, head of household gender, orphan gender, and orphan relatedness to head of household) as covariates. All models included orphan age to account for age differences between orphans and co-resident non-orphans.

Chapter Four: Results

This exploratory study aims to assess whether the Haitian households that care for elementary and middle school aged orphans and co-resident non-orphans treat children differently based on their orphan status. It seeks to understand if, and to what extent, orphan care-giving family characteristics such as household, head of household, and child characteristics moderate intra-household experiences between orphans and co-resident non-orphans to impact orphans' mosquito net usage, years reported attending school, and division of labor in two types of domestic work. The analysis conducted for the research questions and test hypotheses that follow utilized the procedures described in chapter three.

Research Question One

In Haitian households that care for elementary and middle school-aged orphans and co-resident non-orphans, to what extent are intra-household differences between orphans or co-resident non-orphans reported for mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

H1: In Haitian households that care for elementary and middle school aged orphans and co-resident non-orphans, being an orphan or co-resident non-orphan is significantly associated with intra-household differences in reported mosquito net usage, the education in single years, the time spent fetching water or wood, and the time spent performing domestic household work.

A matched pairs t-test was conducted to compare the differences in mosquito net usage, years attended school, hours spent fetching water or wood, and hours spent

performing domestic household work for an orphan and co-resident non-orphan in the same household. There was a significant difference in the scores for orphans who reported *sleeping under a mosquito net last night* (M=.01, SD=.115) and co-resident non-orphans who reported *sleeping under a mosquito net last night* (M=.04, SD=.200); t(602)-3.58, p<.001. There was a significant difference in the scores orphans reported for *years attended school including current school year* (M= 2.64, SD= 2.091) and the scores co-resident non-orphans reported for *years attended school including current school year* (M= 2.37, SD= 2.033); t(607) 2.595, p=.010. There was also a significant difference in the scores orphans reported for *hours spent fetching water or wood in the past week* (M= 5.52, SD= 4.724) and the scores co-resident non-orphans reported for *hours spent fetching water or wood in the past week* (M= 4.85, SD= 4.060); t(387) 4.045, p<.001. In addition, there was a significant difference in the scores orphans reported for *hours spent doing domestic household work in the past week* (M= 5.99, SD= 5.030) and the scores co-resident non-orphans reported for *hours spent doing domestic household work in the past week* (M= 5.04, SD= 3.966); t(364) 4.023, p<.001.

TABLE 3: *PAIRED SAMPLE STATISTICS*

			M	*n*	*S.D.*	*S.E.*
Pair 1	Type of mosquito bed net(s) person slept under last night	Orphan	.01	603	.115	.005
		Non-Orphan	.04	603	.200	.008
Pair 2	Education in single years	Orphan	2.64	608	2.091	.085
		Non-Orphan	2.37	608	2.033	.082
Pair 3	Hours spent fetching wood or water	Orphan	5.52	388	4.724	.240
		Non-Orphan	4.85	388	4.060	.206
Pair 4	Hours spent doing domestic household work	Orphan	5.99	365	5.030	.263
		Non-Orphan	5.04	365	3.966	.208

TABLE 4: *PAIRED SAMPLES CORRELATION*

		n	*Correlation*	*p*
Pair 1	Person slept under mosquito net last night	603	.339	< .001
Pair 2	Education in single years including current school year	608	.209	< .001
Pair 3	Hours spent fetching wood or water	388	.730	< .001
Pair 4	Hours spent doing domestic household work	365	.517	< .001

TABLE 5: *PAIRED SAMPLES TEST*

		M	*S.D.*	*S.E.*	*95% CI*		*t*	*n*	*p*
					LL	*UL*			
Pair 1	Type of mosquito bed net(s) person slept under last night	-.028	.193	.01	-.04	-.01	-3.58	602	<.001
Pair 2	Education in single years	.273	2.59	.11	.07	.48	2.60	607	.010
Pair 3	Hours spent fetching wood or water	.675	3.29	.17	.35	1.00	4.05	387	<.001
Pair 4	Hours spent doing domestic household work	.951	4.52	.24	.49	1.42	4.02	364	<.001

Note. *95% Confidence interval of the difference*

TABLE 6: *SAMPLE DESCRIPTIVES USING MATCHED PAIRS T-TEST FOR EQUALITY OF MEANS*

		Orphan		*Not Orphan*		*t*-test
	n	*M*	*SD*	*M*	*SD*	
Slept under mosquito bed net(s) last night	603	0.01	0.11	0.04	0.20	-3.58***
Years attended school in single years – including current school year	608	2.64	2.09	2.37	2.03	2.60**
Hours spent fetching water or wood	388	5.52	4.72	4.85	4.06	4.04***
Hours spent doing domestic household work	365	5.99	5.03	5.04	3.97	4.02***

Notes. *** p<.001; ** p <.05.
M- Mean. SD- Standard Deviation

The results suggest that households caring for elementary and middle school-age orphans and co-resident non-orphans provide different experiences in the household for children based on orphan status. The results indicate that households caring for elementary and middle school-age orphans and co-resident non-orphans had more non-orphans sleeping under mosquito nets than orphaned children. It is important to recall that very few orphans and co-resident non-orphans slept under mosquito nets in general, so this result should be interpreted with caution.

The results suggest that households caring for elementary and middle school-age orphans and co-resident non-orphans have orphaned children with more years of education than co-resident non-orphans in the household. Although the results of the Matched Pairs T-test for education suggest orphans are at an advantage for years of school attended, this result should be interpreted with caution as the test did not control for age and orphans are generally older than non-orphans (UNICEF, 2004).

The results also suggest that households caring for elementary and middle school-age orphans and co-resident non-orphans have an inequitable distribution of household chores. Orphans report performing more hours of household work fetching water or wood and performing domestic household chores than co-resident non-orphans. Although these findings were statistically significant, it is important to note that the mean time difference orphans and co-resident non-orphans spent on each of these household tasks was less than an hour.

Research Question Two

In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

H2: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household size significantly moderates reported intra-household differences between orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood, or performing domestic household work.

A multivariate analysis of covariance (MANCOVA) was used to assess whether intra-household differences in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work were moderated by household size. The MANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

Results indicate that household size does not moderate the intra-household differences in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work, Pillai's trace = .019, $F(4, 294) = 1.451$, $p = .217$, multivariate $\eta^2 = .019$. See Appendix O.

H3: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household wealth significantly moderates the difference between orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work.

A multivariate analysis of covariance (MANCOVA) was conducted to assess whether intra-household differences in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work were moderated by household wealth. The MANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

Results indicate that household wealth does not moderate intra-household differences in orphan and co-resident non-orphans reported mosquito net usage, years attended school, and time spent fetching water or wood, or performing domestic household work, Pillai's trace = .018, $F(4, 295) = 1.334$, $p = .257$, multivariate $\eta^2 = .018$. See Appendix P.

Research Question Three

In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do head of household characteristics moderate existing intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

H4: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, head of household age significantly moderates intra-household differences for orphan and co-resident non-orphan reported mosquito net usage, years attended school, time spent fetching water or wood, and time spent performing domestic household work.

A multivariate analysis of covariance (MANCOVA) was used to assess whether intra-household differences in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work were moderated by head of household age. The MANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

Results indicate that head of household age does not moderate the intra-household mean difference in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work, Pillai's trace = .018, $F(4, 295) = 1.350$, $p = .251$, multivariate $\eta^2 = .018$ (see Appendix Q).

H5: In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, head of household gender significantly moderates intra-household differences in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, time spent fetching water or wood, and time spent performing domestic household work.

A multivariate analysis of covariance (MANCOVA) was used to assess whether intra-household differences in orphans' and co-resident non-orphans' reported mosquito

net usage, years attended school, and time spent fetching water or wood, or performing domestic household work were moderated by head of household gender. The MANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

Results indicate that head of household gender does not moderate intra-household differences in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work, Pillai's trace = .013, $F(4, 295) = .961$, $p = .429$, multivariate $\eta^2 = .013$. See Appendix R.

Research Question Four

In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan characteristics moderate intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

H6: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, orphan gender significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, years attended school, time spent fetching water or wood, and time spent performing domestic household work.

A multivariate analysis of covariance (MANCOVA) was used to assess whether intra-household differences in orphans and co-resident non-orphans reported mosquito net usage, years attended school, and time spent fetching water or wood, or performing

domestic household work were moderated by orphan gender. The MANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

A significant moderation effect for orphan gender was found, Pillai's trace = .035, $F(4, 295) = 2.705$, $p = .031$, multivariate $\eta^2 = .035$. Examination of the coefficients indicated that orphan gender (1.293) contributed to the intra-household differences for reported hours spent performing domestic household work, $p = .004$. Orphan gender did not moderate intra-household differences in reported mosquito net usage ($p = .899$), years of education ($p = .870$), or hours spent fetching water or wood ($p = .856$). Follow-up ANCOVA indicated that being a female orphan increases the difference in hours spent performing domestic household work, $F(4, 295) = 8.421$, $p = .004$. See Table 7 and Table 8 to follow. See Appendix S for more detail.

TABLE 7: *MULTIVARIATE ANALYSIS OF COVARIANCE FOR ORPHAN GENDER*

Effect	*Pillai's Trace*	*Multivariate F*	*Hypothesis df*	*Error df*	*Eta Squared*
Intercept	0.112	9.320 ***	4	295	0.112
orAge	0.163	14.317 ***	4	295	0.163
orGender	0.035	2.705 **	4	295	0.035

Design: Intercept + orAge + orGender

Computed using alpha = .05

TABLE 8: *ANALYSIS OF COVARIANCE FOR ORPHAN GENDER*

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*
Corrected Model	mdMosquito	.002[a]	2	0.001	0.031
	mdEducation	221.943[b]	2	110.972	22.221 ***
	mdHours_Fetched_WW	98.801[c]	2	49.4	7.482 ***
	mdHours_Dom_Work	294.520[d]	2	147.26	9.901 ***
Intercept	mdMosquito	0.002	1	0.002	0.089
	mdEducation	130.667	1	130.667	26.165 ***
	mdHours_Fetched_WW	28.57	1	28.57	4.327 **
	mdHours_Dom_Work	223.904	1	223.904	15.054 ***
orAge	mdMosquito	0.001	1	0.001	0.047
	mdEducation	221.934	1	221.934	44.441 ***
	mdHours_Fetched_WW	98.775	1	98.775	14.961 ***
	mdHours_Dom_Work	160.219	1	160.219	10.773 ***
orGender	mdMosquito	0	1	0	0.016
	mdEducation	0.135	1	0.135	0.027
	mdHours_Fetched_WW	0.218	1	0.218	0.033
	mdHours_Dom_Work	125.249	1	125.249	8.421 ***

Error	mdMosquito	7.879	298	0.026
	mdEducation	1488.196	298	4.994
	mdHours_Fetched_WW	1967.512	298	6.602
	mdHours_Dom_Work	4432.125	298	14.873

[a] R Squared = .000 (Adjusted R Squared = -.007). [b] R Squared = .130 (Adjusted R Squared = .124). [c] R Squared = .048 (Adjusted R Squared = .041). [d] R Squared = .062 (Adjusted R Squared = .056).

H7. In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, orphan relatedness to their head of household significantly moderates intra-household differences in orphan and co-resident non-orphan reported mosquito net usage, years attended school, time spent fetching water or wood, and time spent performing domestic household work.

A multivariate analysis of covariance (MANCOVA) was used to assess whether intra-household differences in orphans' and co-resident non-orphans' reported mosquito net usage, years attended school, and time spent fetching water or wood or performing domestic household work were moderated by orphans' relatedness to their head of household. The MANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

A significant moderating effect was found for orphans' relatedness to their head of household, Pillai's trace = .035, $F(4, 295) = 2.638$, $p = .034$, multivariate $\eta^2 = .035$. Examination of the coefficients indicated that orphans' closer biological relatedness to their head of household (.262) contributed to increased intra-household differences for reported years attended school in single years, $p = .013$. Orphans' relatedness to their head of household did not moderate intra-household differences in reported mosquito net usage ($p = .210$), hours spent fetching water or wood ($p = .868$), or hours spent performing domestic household work ($p = .369$). See Table 9 and 10 to follow.

Follow-up ANCOVA indicated that orphans' relatedness to their head of household significantly contributes to intra-household differences for years attended school, $F(4, 295) = 6.227$, $p = .013$. Specifically, the findings indicate the stronger the

biological relationship between the orphan and their head of household (.262) the larger the difference in years of education attended between orphans and co-resident non-orphans. See Appendix T for more detail.

TABLE 9: *MULTIVARIATE ANALYSIS OF COVARIANCE FOR ORPHAN'S RELATEDNESS TO THEIR HEAD OF HOUSEHOLD*

Effect	*Pillai's Trace*	*F*	*Hypothesis df*	*Error df*	*Eta Squared*
Intercept	0.142	12.160 ***	4	295	0.142
orAge	0.173	15.384 ***	4	295	0.173
orRelationHH	0.035	2.638 **	4	295	0.035

Design: Intercept + orAge + orRelationHH
Computed using alpha = .05

TABLE 10: *ANALYSIS OF COVARIANCE FOR ORPHAN'S RELATEDNESS TO THEIR HEAD OF HOUSEHOLD*

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*
Corrected Model	mdMosquito	.043[a]	2	0.021	0.813
	mdEducation	252.274[b]	2	126.137	25.783 ***
	mdHours_Fetched_WW	98.766[c]	2	49.383	7.479 ***
	mdHours_Dom_Work	181.613[d]	2	90.806	5.954 ***
Intercept	mdMosquito	0.025	1	0.025	0.954
	mdEducation	209.342	1	209.342	42.791 ***
	mdHours_Fetched_WW	31.652	1	31.652	4.794 **
	mdHours_Dom_Work	39.632	1	39.632	2.599
orAge	mdMosquito	8.09E-05	1	8.09E-05	0.003
	mdEducation	239.074	1	239.074	48.869 ***
	mdHours_Fetched_WW	98.119	1	98.119	14.861 ***
	mdHours_Dom_Work	155.634	1	155.634	10.204 ***
orRelationHH	mdMosquito	0.042	1	0.042	1.58
	mdEducation	30.466	1	30.466	6.227 **
	mdHours_Fetched_WW	0.184	1	0.184	0.028
	mdHours_Dom_Work	12.342	1	12.342	0.809

Error	mdMosquito	7.838	298	0.026
	mdEducation	1457.866	298	4.892
	mdHours_Fetched_WW	1967.546	298	6.603
	mdHours_Dom_Work	4545.032	298	15.252

[a] R Squared = .005 (Adjusted R Squared = -.001). [b] R Squared = .148 (Adjusted R Squared = .142). [c] R Squared = .048 (Adjusted R Squared = .041). [d] R Squared = .038 (Adjusted R Squared = .032).

Research Question Five

In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, to what extent do orphan care-giving family characteristics such as household, head of household, and orphan characteristics interact to predict intra-household differences in reported mosquito net usage, education in single years, time spent fetching water or wood, and time spent performing domestic household work?

H8: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported mosquito net usage.

An analysis of covariance was used to assess whether household characteristics, head of household characteristics, and orphan characteristics predict intra-household differences in reported mosquito net usage. The ANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans. See original univariate model for predicting differences in mosquito net usage on Table 11 to follow.

TABLE 11: *ORIGINAL MODEL ANCOVA PREDICTING DIFFERENCES IN MOSQUITO NET USAGE*

Tests of Between-Subjects Effects

Dependent Variable: dMosquito

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	.564[a]	7	.081	2.184	.034	.025	15.287	.824
Intercept	.002	1	.002	.045	.832	.000	.045	.055
orAge	.009	1	.009	.235	.628	.000	.235	.077
orGender	.121	1	.121	3.278	.071	.005	3.278	.440
orHSize	.009	1	.009	.250	.617	.000	.250	.079
orHWealth	.120	1	.120	3.264	.071	.005	3.264	.438
orRelationHH	.126	1	.126	3.408	.065	.006	3.408	.454
orHHGender	.000	1	.000	.004	.950	.000	.004	.050
orHHAge	.018	1	.018	.495	.482	.001	.495	.108
Error	21.957	595	.037					
Total	23.000	603						
Corrected Total	22.521	602						

[a] R Squared = .025 (Adjusted R Squared = .014). [b] Computed using alpha = .05

The model was then re-run deleting non-significant results until there was significance. The results, after this process, indicate that household wealth and an orphans' relatedness to their head of household were significant in predicting differences in reported mosquito net usage (see Table 12). Unlike all of the other models in the present exploratory study, the results indicated that orphan age did not contribute to this model.

Examination of the combined results for mosquito net usage suggests a statistically significant but small amount of variance is associated with household wealth and the orphan's relatedness to their head of household. In particular, differences in

mosquito net usage increase with household wealth and differences in mosquito net usage decrease when the orphan is more related to their head of household. See Appendix U1 and U2 for original model, and U3 and U4 for final ANCOVA model.

TABLE 12: *ANALYSIS OF COVARIANCE FOR PREDICTING DIFFERENCES IN MOSQUITO NET USAGE*

Source	*df*	*F*	η	*p*	B	Error
Household Wealth	1	4.915	.008	.027	.013	595
Orphan's Relatedness to Head of Household	1	4.950	.008	.026	-.014	595

Note. R^2=.017

H9: In Haitian households with elementary and middle school aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported education in single years.

An analysis of covariance was conducted to assess whether household characteristics, head of household characteristics, and orphan characteristics predict intra-household differences in education in single years. The ANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans. See original univariate model for predicting differences in years attended school on Table 13 to follow.

TABLE 13: *ORIGINAL MODEL ANALYSIS OF COVARIANCE FOR PREDICTING DIFFERENCES IN YEARS ATTENDED SCHOOL*

Tests of Between-Subjects Effects

Dependent Variable: dEducation

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	745.060[a]	7	106.437	19.048	.000	.183	133.334	1.000
Intercept	230.935	1	230.935	41.327	.000	.065	41.327	1.000
orGender	7.803	1	7.803	1.396	.238	.002	1.396	.218
orHSize	.978	1	.978	.175	.676	.000	.175	.070
orAge	672.674	1	672.674	120.380	.000	.168	120.380	1.000
orHWealth	15.877	1	15.877	2.841	.092	.005	2.841	.391
orRelationHH	89.241	1	89.241	15.970	.000	.026	15.970	.979
orHHGender	.979	1	.979	.175	.676	.000	.175	.070
orHHAge	2.550	1	2.550	.456	.500	.001	.456	.104
Error	3330.410	596	5.588					
Total	4120.000	604						
Corrected Total	4075.470	603						

[a] R Squared = .183 (Adjusted R Squared = .173). [b] Computed using alpha = .05.

The model was then re-run deleting non-significant results until there was significance. The results, after this process, indicated that reported differences in education in single years were predicted by an orphans' relatedness to their head of household. The results indicate that the difference in years of education (.356) increases when orphans are more closely related to their head of household. Orphan age and an orphans' relatedness to their head of household accounted for 17.7% of the differences in reported years attended school. See Table 14 to follow. See Appendix V3 and V4 for final ANCOVA model.

TABLE 14: *ANALYSIS OF COVARIANCE FOR PREDICTING DIFFERENCES IN YEARS ATTENDED SCHOOL*

Source	*df*	*F*	η	*p*	B	Error
Orphan Age	1	118.524	.164	.000	.410	602
Orphan's Relatedness to Head of Household	1	20.850	.033	.000	.356	602

Note. R^2=.177

H10: In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported time spent fetching water or wood.

An analysis of covariance was conducted to assess whether household characteristics, head of household characteristics, and orphan characteristics predict intra-household differences in time spent fetching water or wood. The ANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

The results indicate that there are no differences in reported hours spent fetching water or wood that can be predicted based on household characteristics, head of household characteristics, and orphan characteristics. See original model on Table 15 to follow. See Appendix W3 and W4 for the final ANCOVA model that indicated only orphan age is significant in predicting differences.

TABLE 15: *ORIGINAL MODEL ANALYSIS OF COVARIANCE FOR PREDICTING DIFFERENCES IN HOURS SPENT FETCHING WATER OR WOOD*

Tests of Between-Subjects Effects

Dependent Variable: dHours_Fetched_WW

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	155.280[a]	7	22.183	3.026	.004	.053	21.179	.938
Intercept	16.400	1	16.400	2.237	.136	.006	2.237	.320
orGender	3.807	1	3.807	.519	.472	.001	.519	.111
orHSize	9.284	1	9.284	1.266	.261	.003	1.266	.202
orAge	107.095	1	107.095	14.607	.000	.037	14.607	.968
orHWealth	7.643	1	7.643	1.042	.308	.003	1.042	.175
orRelationHH	.000	1	.000	.000	.995	.000	.000	.050
orHHGender	7.982	1	7.982	1.089	.297	.003	1.089	.180
orHHAge	22.696	1	22.696	3.096	.079	.008	3.096	.419
Error	2778.741	379	7.332					
Total	3066.000	387						
Corrected Total	2934.021	386						

[a] R Squared = .053 (Adjusted R Squared = .035). [b] Computed using alpha = .05.

H11: In Haitian households with elementary and middle school-aged orphans and co-resident non-orphans, household characteristics, head of household characteristics, and orphan characteristics significantly predict intra-household differences in reported time spent performing domestic household work.

An analysis of covariance was conducted to assess whether household characteristics, head of household characteristics, and orphan characteristics predict intra-household differences in hours spent performing domestic household work for orphans and co-resident non-orphans. The ANCOVA model included orphan age to account for age differences between orphans and co-resident non-orphans.

The results indicate that orphan gender and household size were significant in predicting intra-household differences in hours spent performing domestic chores (Table 16). In particular, the difference in hours spent performing domestic household work increases when the orphan is female (1.302), and the difference in hours spent performing domestic work decreases as household size (-.218) increases. See Appendix X for more detail.

TABLE 16: *ANALYSIS OF COVARIANCE FOR PREDICTING DIFFERENCES IN HOURS SPENT PERFORMING DOMESTIC HOUSEHOLD WORK*

Source	*df*	*F*	η	*p*	B	Error
Orphan Age	1	13.798	.037	.000	.339	361
Orphan Gender	1	7.971	.022	.005	1.302	361
Household Size	1	6.735	.018	.010	-.218	361

Note. R^2=.074

In summary, the findings from the current study indicate that there are statistically significant intra-household differences in the reported experiences of elementary and middle school-aged orphans when compared to their co-resident non-orphans in Haitian households. Findings indicate that household characteristics and orphan characteristics moderate intra-household differences in reported mosquito net usage, attending fewer years of school, and inequitable division of labor in two types of domestic work when including orphan age in the model. Head of household characteristics do not moderate intra-household differences. In addition, the findings indicate that different combinations of household size, household wealth, orphan gender, and an orphan's relatedness to their head of household can predict intra-household differences for reported mosquito net

usage, years attended school, and hours spent performing domestic household work. However, no factors in the present study could predict differences in hours spent fetching water or wood.

Although there was statistical significance for many of the present study's findings, the amount of actual difference that was detected in the Matched Pair T-test was small. Moreover, when moderating variables were significant to the MANCOVA models they typically added little above and beyond orphan age. The findings of the present study should be taken with caution given their lack of practical significance and the limitations of the study (which will be discussed in the next chapter).

Chapter Five: Discussion, Implications & Conclusion

This chapter will begin with a discussion of the findings. It will then discuss implications for policy and practice, and future research. Finally, this chapter will outline the limitations of the study before summarizing the overall findings in the conclusion.

Discussion

There is a need to revisit potential risk factors for orphaned children in different national contexts. Studies such as Akwara et al. (2010) illustrate national differences in risk markers, and the present exploratory study adds to the diversity of findings on orphan risk and intra-household differences. In the current study, statistically significant intra-household differences between elementary and middle school-aged orphans and co-resident non-orphans exist. However, the amount of difference between the two groups for all four dependent variables is negligible.

Likewise, the potential moderators of orphans' household experiences (i.e. household wealth, household size, head of household age, head of household gender, and an orphan's relatedness to their head of household) were not significant in the present study or if they were, their directionality often contrasted with past research. For instance, head of household age and head of household gender had no moderating effect on intra-household differences. These findings are in contrast to the literature from Sub-Saharan Africa that suggests advanced head of household age is associated with multiple risk factors for orphans (Goldberg & Short, 2011; Beegle et al., 2010a; Miller et al., 2007; Howard et al., 2006.). This finding of no moderating effect is also in contrast to Parker and Short's (2009) work that indicated grandmothers might be a protective factor for orphans' educational attainment.

Similarly, in the current study, increased household wealth increased the difference in orphan mosquito net usage when compared to co-resident non-orphans. This means orphans might experience the greatest disadvantage for mosquito net usage in wealthier households. This contrasts with the research of Munaaba et al. (2003) who found no differences in mosquito net usage between orphans and non-orphans. Munaaba et al. (2003) also found that low household income is associated with decreased mosquito net usage overall.

The extent to which other educational, health, household work, employment, psychosocial, permanency, abuse or exploitation risks effect orphaned children in Haiti remains unexplored and unknown. Other orphan risk factors might exist, and if found, may have greater practical significance for policy and practice in Haiti than the present study. Alternatively, overall orphan risk might be diminished in a national context such as Haiti that struggles with low educational enrollment for all children and other key resource investments for children, and is affected by frequent natural disasters that affect adult and child mortality and public infrastructure.

More national level exploratory research is needed to strengthen the field's understanding of risk for orphans worldwide (Akwara et al., 2010) including Haiti. Researchers like Hoffman (2012) have asserted that there are formidable gaps in the literature that need to be filled in order to understand the lives of vulnerable children in Haiti. Moreover, there is a need for anthropological research on children in Haiti so scholars have a multi-dimensional, child centered, and culturally informed perspective on how vulnerability and children's agency work together in everyday life (Hoffman, 2012).

Implications

The current study's findings of minimal intra-household differences between orphans and co-resident non-orphans points to an experience many orphans might have while in family care. While future research may address the gaps in the orphan care literature in Haiti, family programs currently serve thousands of orphans and their families (UNICEF, 2006). Even though the findings from the current exploratory study do not yield results with practical significance for policy or practice, they speak to two needs in the international child welfare community.

First, the limited research on Haitian orphans in general and the present study's inconclusive findings on orphan risk markers highlight the need for community engagement in existing and future programming for orphaned children and their families. Stark, Ager, Wessels, & Boothby (2009) reported how different communities have their own definitions and indicators of well-being for special populations of children. A community-engaged approach to understand local definitions of orphan vulnerability and orphan well-being, and to explore the extent of the orphan care concern in the community, can strengthen existing programs and inform the scope and content of future family support services design and evaluation. Findings from community conversations of orphan vulnerability and risk can help create culturally grounded indicators of orphan risk and vulnerability (Stark et al., 2009) that should inform the exploration of national indicators for Haiti.

Second, the work of Skinner et al. (2006) summarized another aspect of the disconnect that can occur between international definitions of orphan risk and vulnerability, and local communities' definition of these same terms. The focus group

data from Skinner et al. (2006) indicated that some local communities may not consider a child who has lost only one parent an orphan. Rather, communities may define orphan status based on the convergence of factors such as who is/was the primary wage earner, the bond between parent and child, parental involvement, parental income earning capacity, and the strength of the extended family system to provide support (Skinner et al., 2006). Their research also outlined how communities can define orphan vulnerability in terms of household safety, love, quality of family care, children being subjected to harsh punishment, children being exposed to inter-personal violence, sufficient food, education, and other factors (Skinner et al., 2006).

According to Skinner et al. (2006), family life indicators such as quality of family care, child discipline, nurturance and love, parental bond, and strength of the extended family system are important aspects of defining orphan vulnerability. However, international datasets frequently used to assess orphan vulnerability do not include indicators like these in their surveys. It would be useful to expand the survey questions on these datasets to include key aspects of family dynamics, parent-child relationships, and extended family functioning so research on orphans and other highly vulnerable children can be strengthened internationally. This data could provide new insights into family life that can help support existing international policy initiatives related to orphaned children, early childhood development for highly vulnerable children, child labor, child protection, and child trafficking.

Limitations

The current exploratory study has several limitations. First, its focus is limited to children between the ages of 5 and 14 who have lost one or both parents (i.e. orphans),

but live in a Haitian household with a co-resident non-orphan in the same age range. Future studies should address intra-household differences in child treatment until at least age 18, as many changes can occur in late adolescence. These changes include differences in secondary school enrollment and completion, increased expectations for domestic labor, increased expectation to work outside of the home for pay, and decreased support for orphaned children as they transition to adulthood and independence. Likewise, important differences in the treatment of orphans when compared to co-resident non-orphans may begin before 5 years of age. The effects of early life intra-household differences are not addressed in the current study.

In addition, the current study only included families where all of the children were in the 5 to 14 age range. As acknowledged earlier in the paper, this significantly limited the number of families in the study. Opening the inclusion criteria to all families with an orphan and co-resident non-orphan in the 5 to 14 age range, regardless of the age of their other children, would have increased the sample size and may have resulted in different findings.

Second, this study assesses how contextual factors like an orphan's relationship to their head of household moderate differences in mosquito net usage, years attended school, hours spent fetching water or wood, and hours spent performing domestic household chores. However, another adult in the household could be the orphan's primary caregiver or have a significant influence on what resources a child receives and what expectations a child needs to meet in the household. The present study is not able to assess the influence of the web of intergenerational relationships that may typify many of the household in the present study.

Third, research on orphaned children and their families typically requires studying contexts of scarcity and disadvantage. Haiti is the poorest country in the western hemisphere and has experienced devastating natural disasters in recent years. The effects of these recent events may have affected the results of the present study. Future studies can assess longitudinal trends in orphan education, health, and household work to explore how the devastating 2010 earthquake may have affect orphaned children in Haiti.

Fourth, and finally, this study has limitations due to its methods. As discussed in chapter 3, the present study did not meet the assumption of multivariate normality. Given the exploratory nature of the study, the researcher decided to proceed with caution and continued the analysis. If the findings of the present study had practical significance, this would limit the generalizability of the results. However, all of the findings in the present study that were statistically significant, did not have practical significance for policy or practice.

Conclusion

In conclusion, the findings from the current study indicate that statistically significance differences exist between elementary and middle school aged orphans and co-resident non-orphans in Haiti. Nevertheless, the intra-household differences are minimal and do not have practical significance for policy or practice.

When including orphan age in the MANCOVA and ANCOVA models, the findings from the present study indicate that household characteristics and orphan characteristics moderate intra-household differences in reported mosquito net usage, fewer years of school, and inequitable division of labor in two types of domestic work. Head of household characteristics do not moderate intra-household differences. In

addition, the findings suggest that different combinations of household size, household wealth, orphan gender, and an orphan's relatedness to their head of household can predict intra-household differences for reported mosquito net usage, years attended school, and hours spent performing domestic household work. No factors in the present study could predict differences in hours spent fetching water or wood. In general, the intra-household differences between orphans and co-resident non-orphans were minimal and lacked practical significance. Similarly, moderating variables such as household wealth, household size, orphan gender, and orphan's relatedness to their head of household, explained very little about intra-household differences above and beyond orphan age. Future research should explore the extent of orphan vulnerability in Haiti using other indicators related to the realization of children's developmental potential.

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Appendix

APPENDIX A: DESCRIPTIVE STATISTICS FOR DEPENDENT VARIABLES FOR ORPHANS AND NON-ORPHANS

Table A1

Descriptive Staistics for Non-orphans

		Mosquito Net Usage		Education in single years		Hours spent fetching water or wood		Hours spent doing domestic household work	
		Statistic	*SE*	*Statistic*	*SE*	*Statistic*	*SE*	*Statistic*	*SE*
N		609		603		420		414	
Mean		0.03	0.01	2.49	0.108	4.74	0.22	5.25	0.235
95% CI	LL	0.01		2.27		4.31		4.78	
	UL	0.05		2.7		5.17		5.71	
5% Trimmed Mean		0		2.39		4.4		4.85	
Median		0		2		4		4	
Variance		0.032		3.506		14.573		16.671	
Std. Deviation		0.179		1.873		3.817		4.083	
Minimum		0		0		0		0	
Maximum		1		8		30		22	
Range		1		8		30		22	
Interquartile Range		0		3		5		5	
Skewness		5.245	0.14	0.55	0.14	1.853	0.14	1.494	0.14
Kurtosis		25.677	0.28	-0.237	0.28	6.885	0.28	2.753	0.28

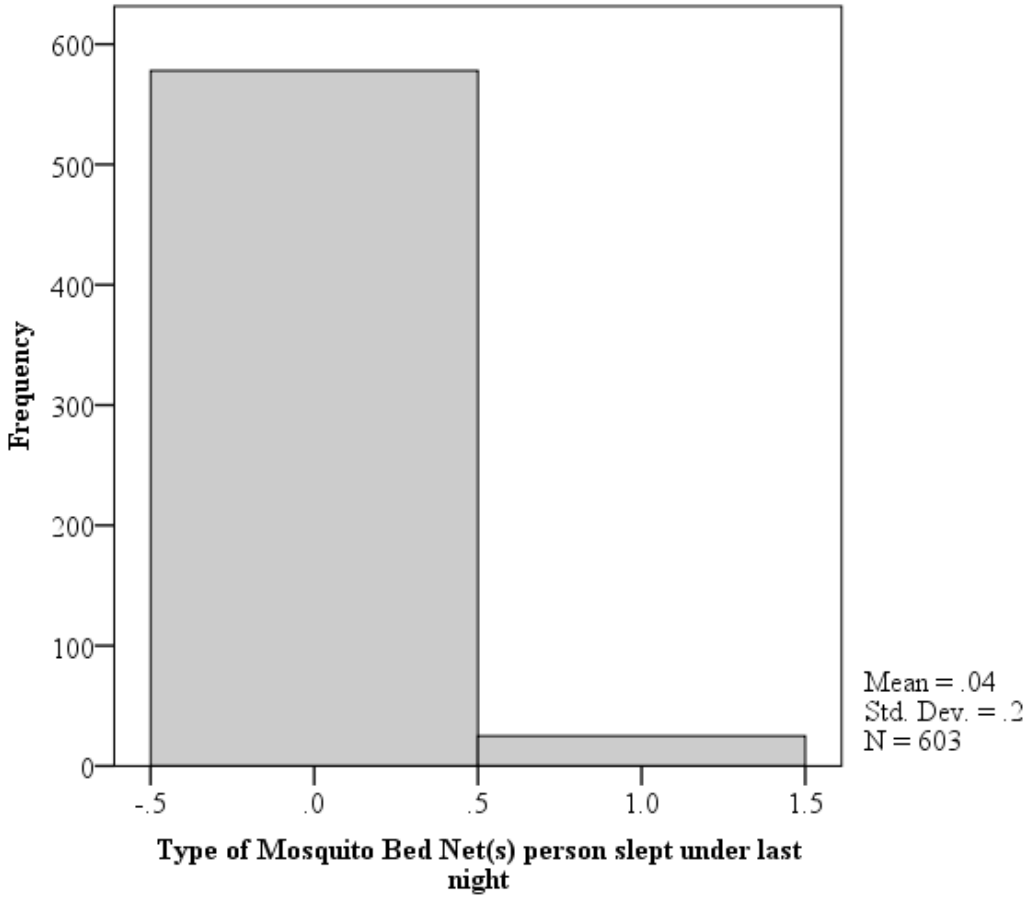
Table A2
Descriptive Statistics for orphans

		Mosquito Net Usage		Education in single years		Hours spent fetching wood or water		Hours spent doing domestic household work	
		Statistic	*SE*	*Statistic*	*SE*	*Statistic*	*SE*	*Statistic*	*SE*
N		608		605		492		479	
Mean		0.01	0.007	2.63	0.109	5.61	0.264	5.77	0.26
95% CI	LL	0		2.41		5.09		5.26	
	UL	0.03		2.84		6.13		6.28	
5% Trimmed Mean		0		2.55		5.15		5.28	
Median		0		2		4		4	
Variance		0.013		3.597		21.01		20.356	
Std. Deviation		0.115		1.897		4.584		4.512	
Minimum		0		0		0		0	
Maximum		1		7		40		28	
Range		1		7		40		28	
Interquartile Range		0		3		6		5	
Skewness		8.558	0.14	0.425	0.14	2.565	0.14	1.77	0.14
Kurtosis		71.715	0.28	-0.674	0.28	12.901	0.28	4.037	0.28

APPENDIX B: HISTOGRAMS FOR DEPENDENT VARIABLES

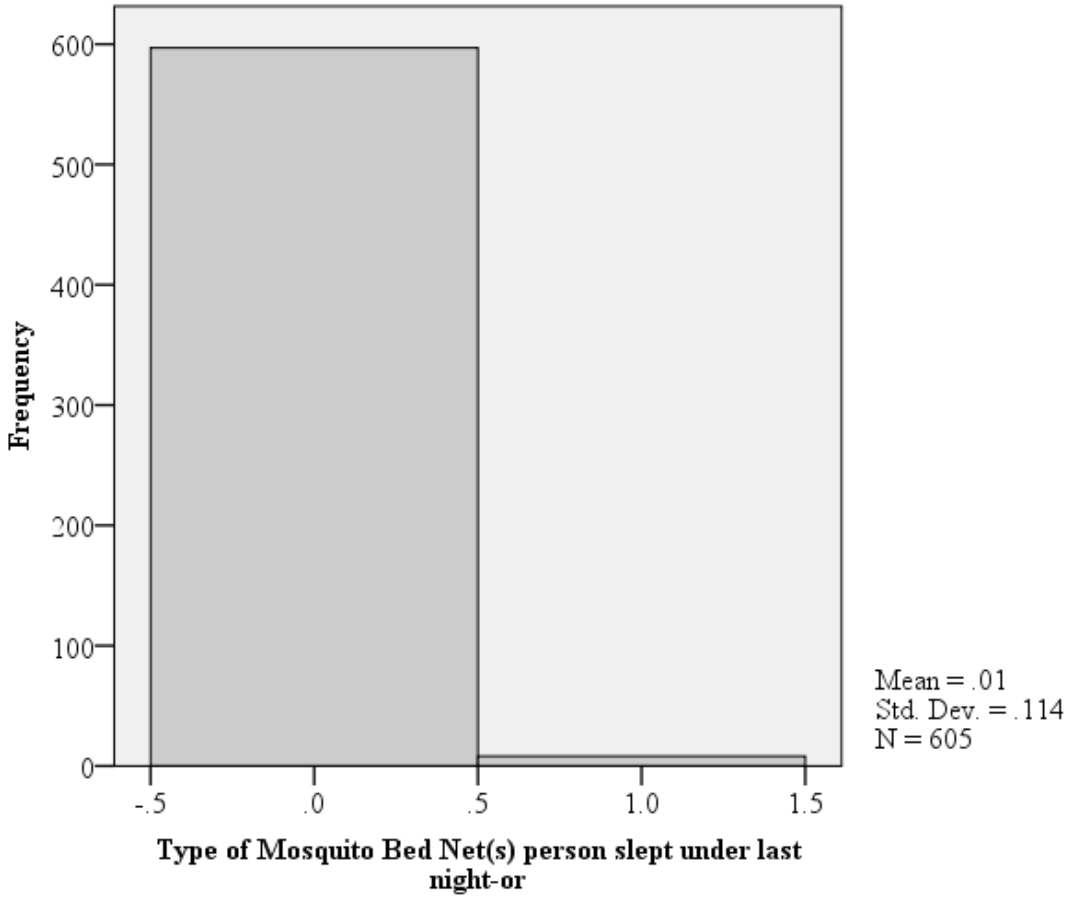
Graph B1

Histogram Mosquito Net Usage for Non-Orphans



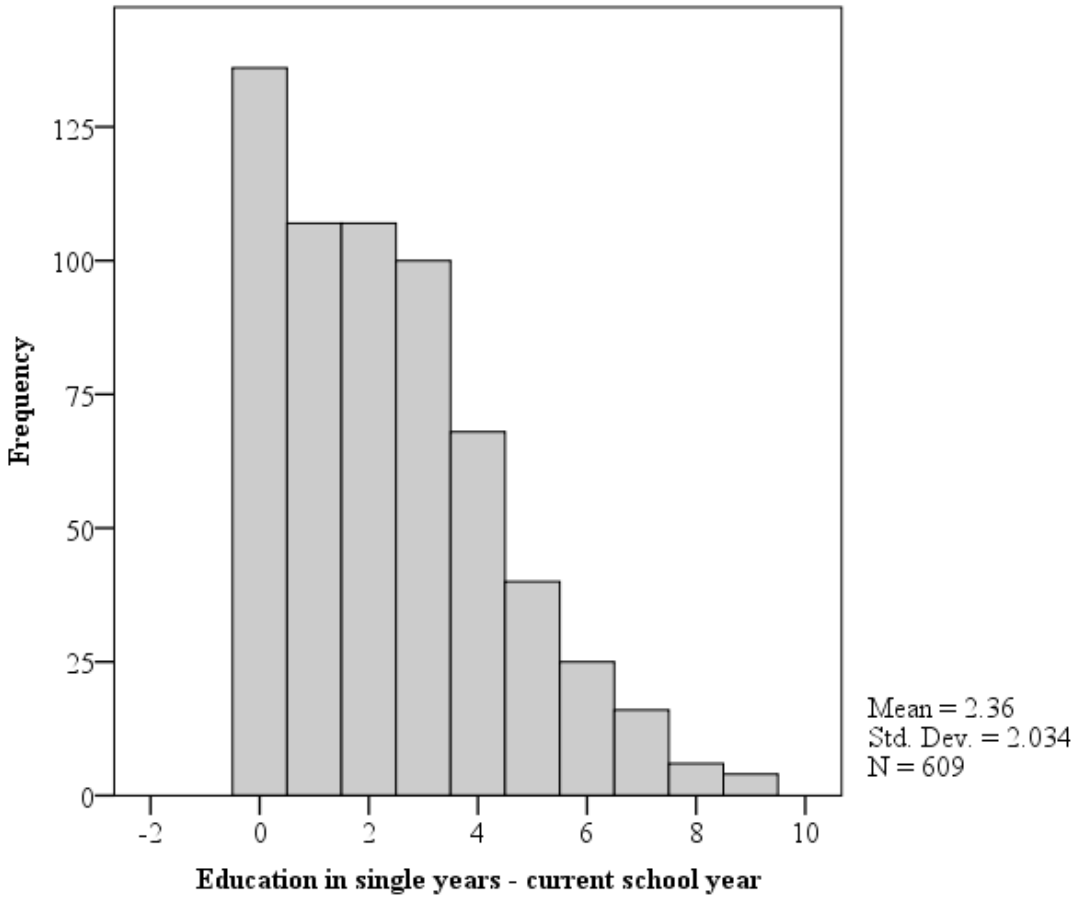
Graph B2

Histogram Mosquito Net Usage for Orphans



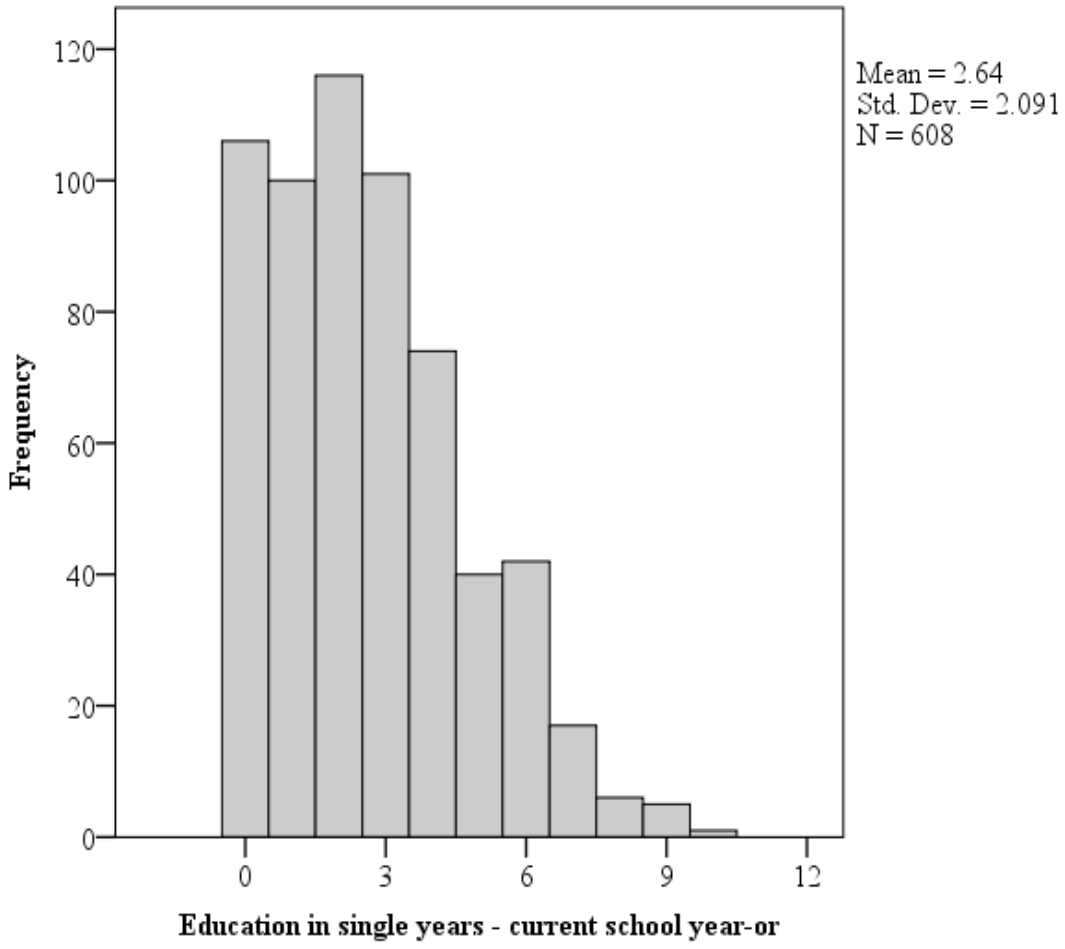
Graph B3

Histogram Years of School Attended including Current for Non-Orphans



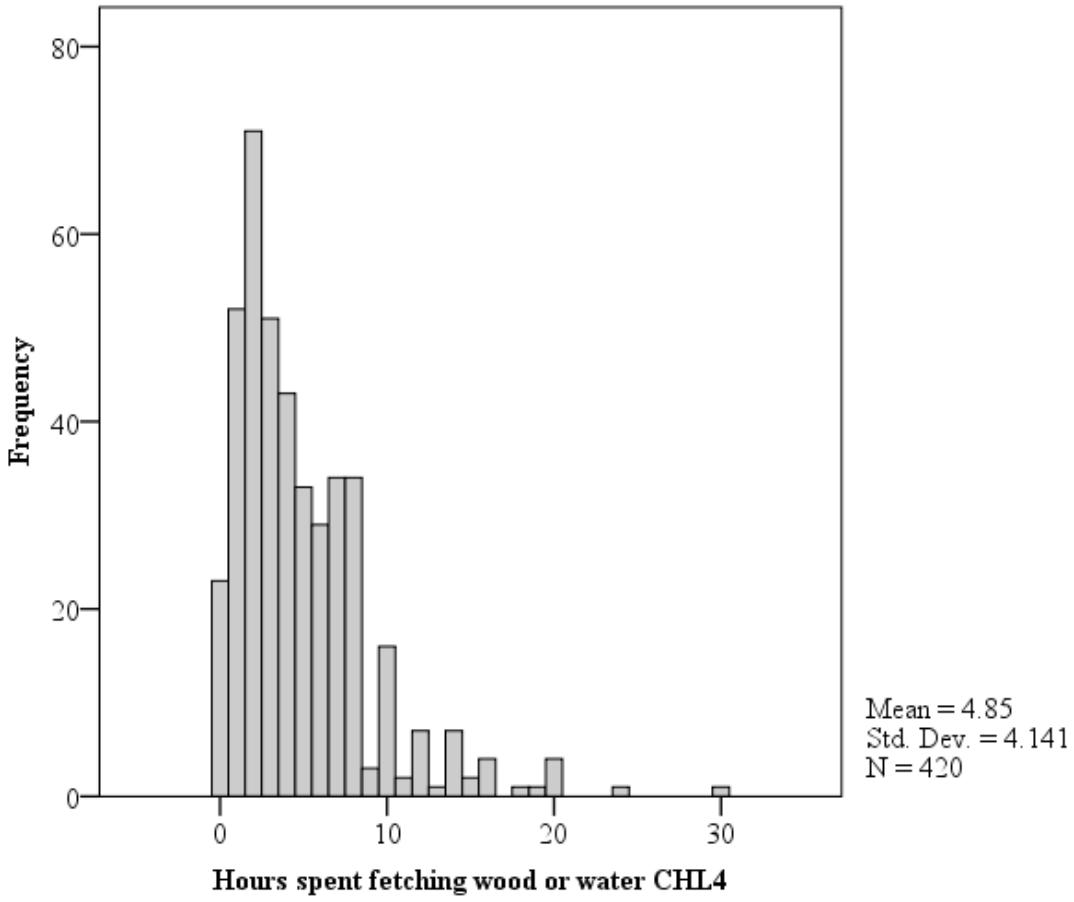
Graph B4

Histogram Years of School Attended including Current for Orphans



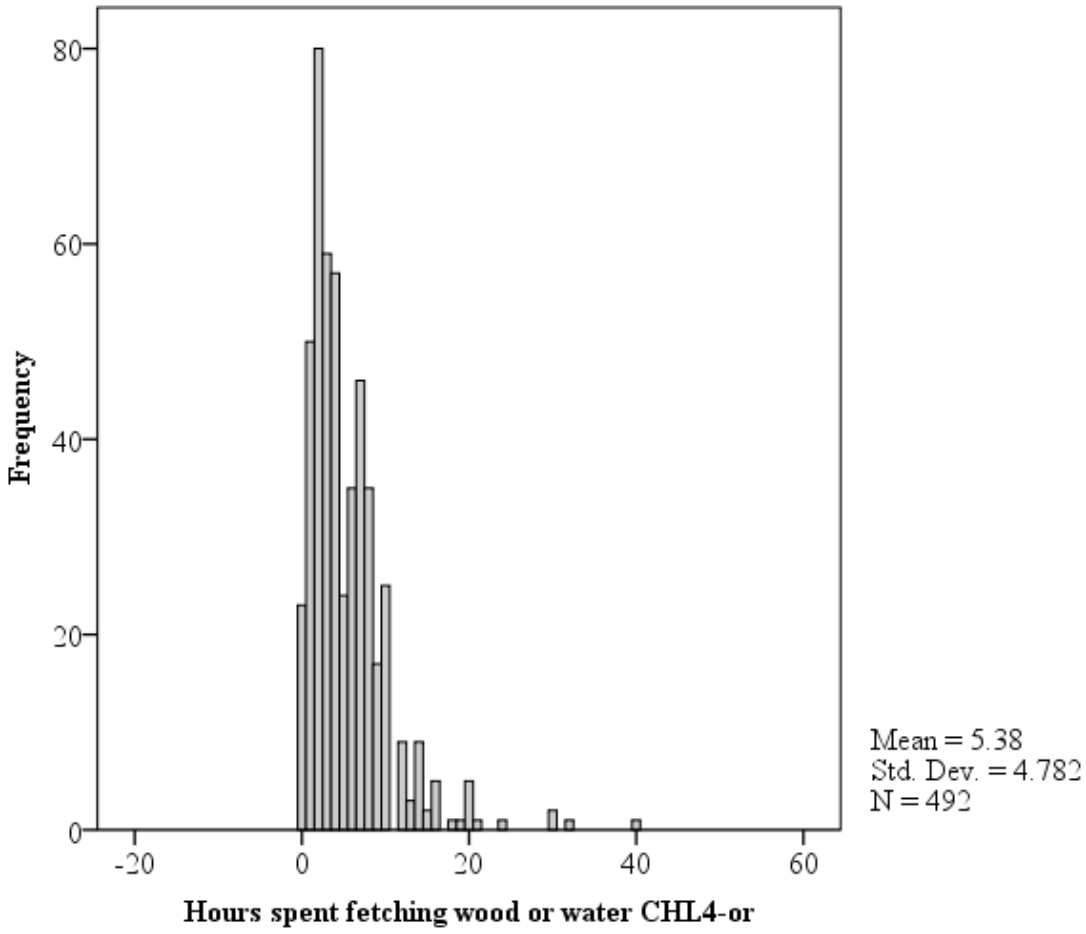
Graph B5

Histogram of Hours Spent Fetching Water or Wood for Non-Orphans



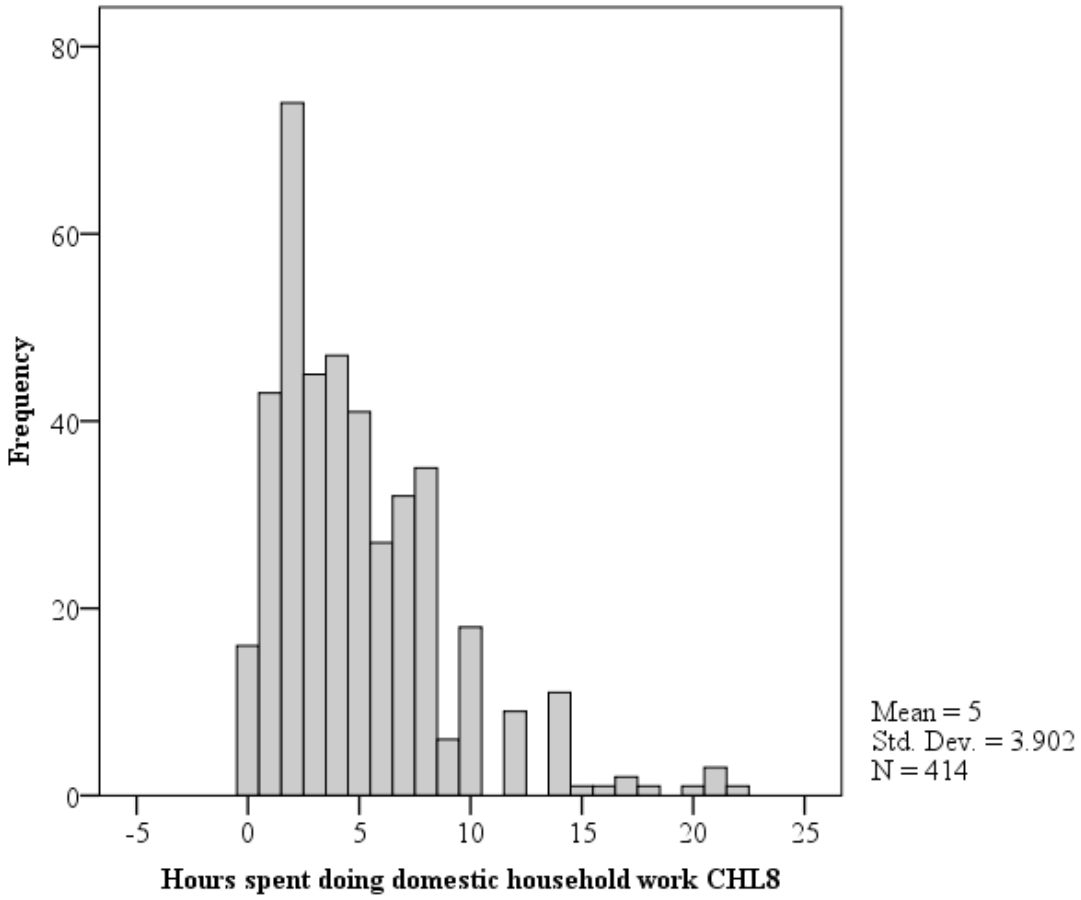
Graph B6

Histogram of Hours Spent Fetching Water or Wood for Orphans



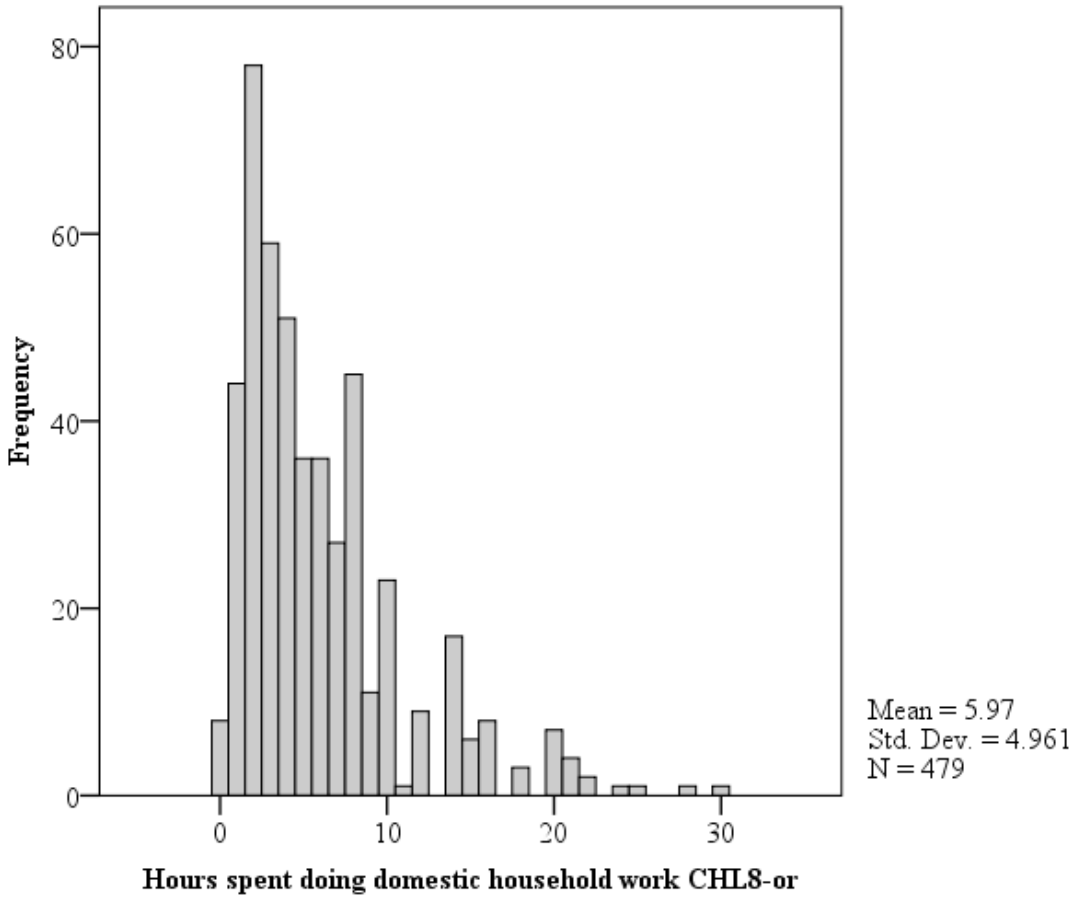
Graph B7

Histogram of Hours Spent Performing Domestic Household Work for Non-Orphans



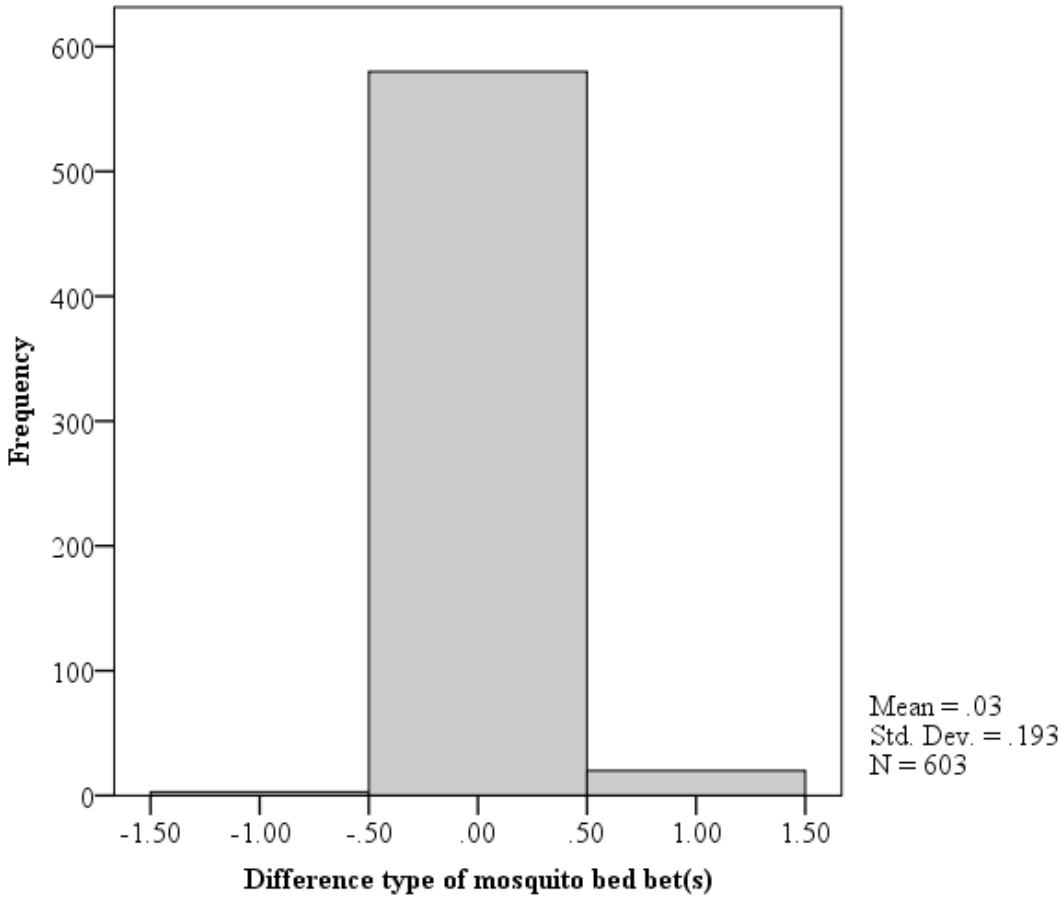
Graph B8

Histogram of Hours Spent Performing Domestic Household Work for Orphans



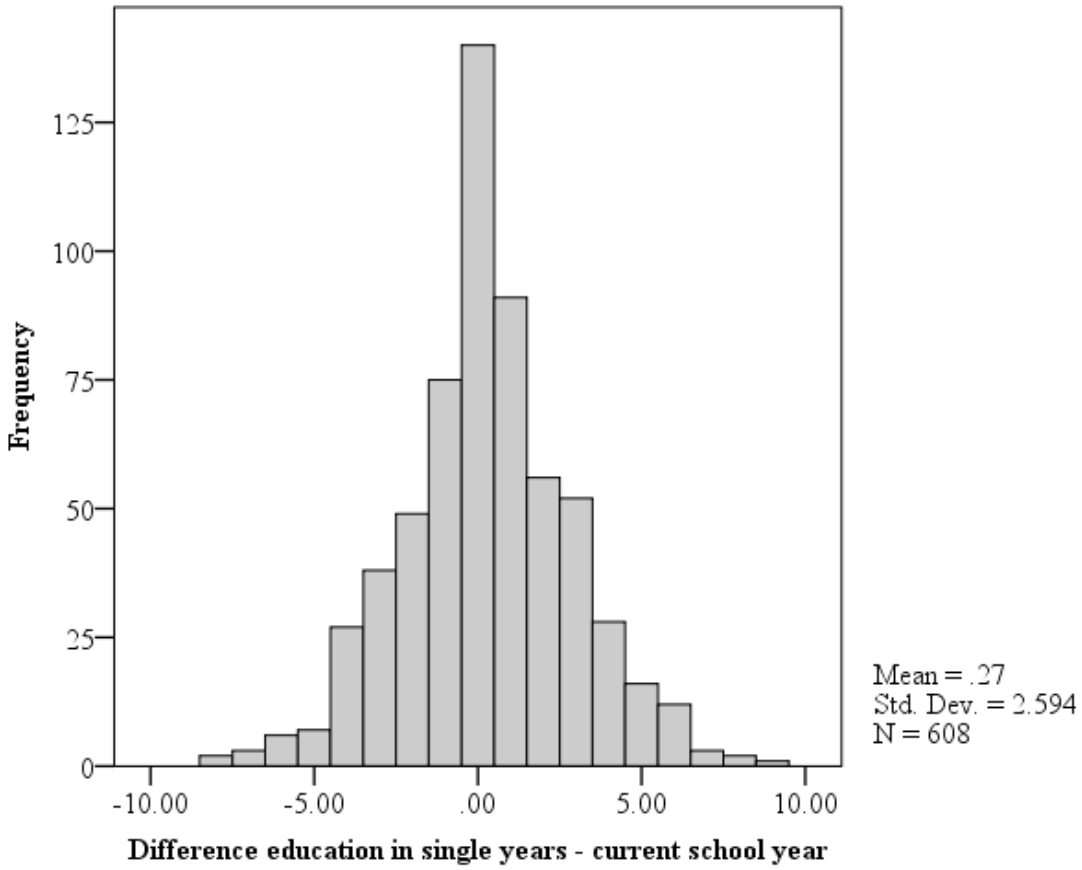
Graph B9

Histogram of Difference Score for Mosquito Net Usage



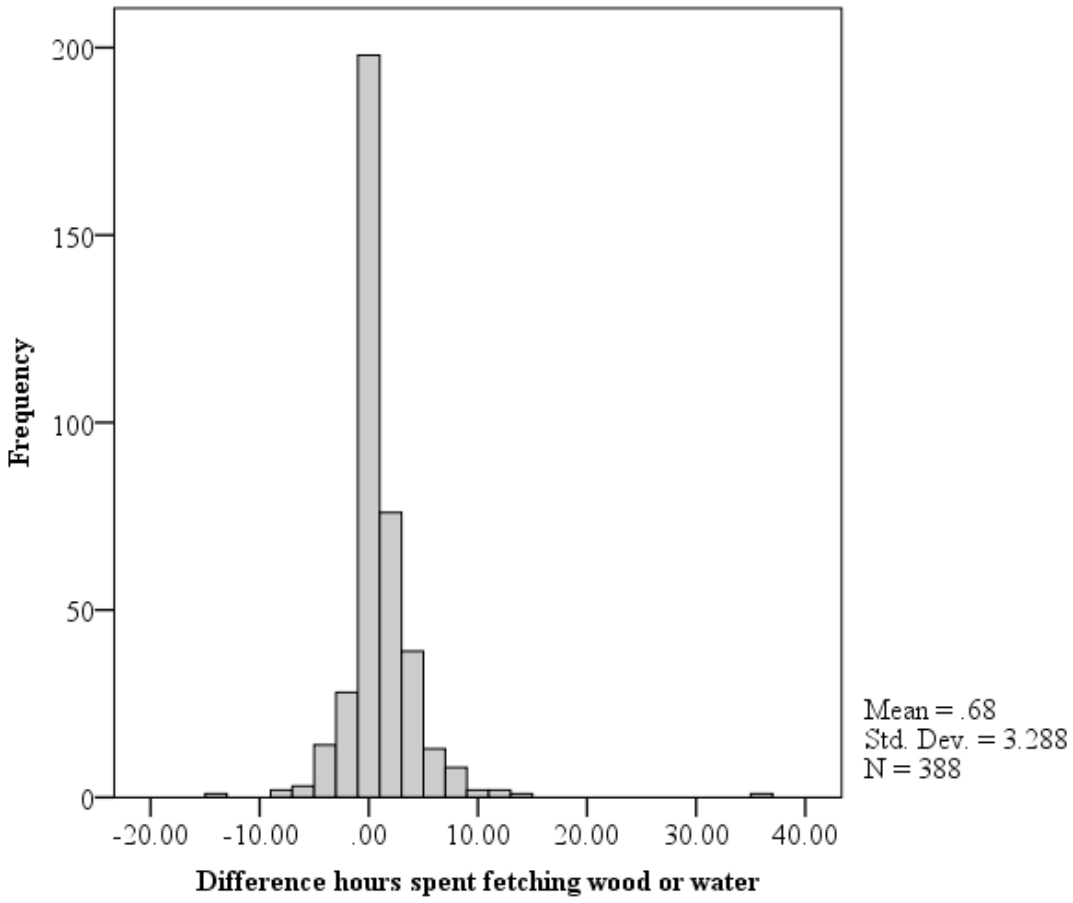
Graph B10

Histogram of Difference Score for Years of School Attended



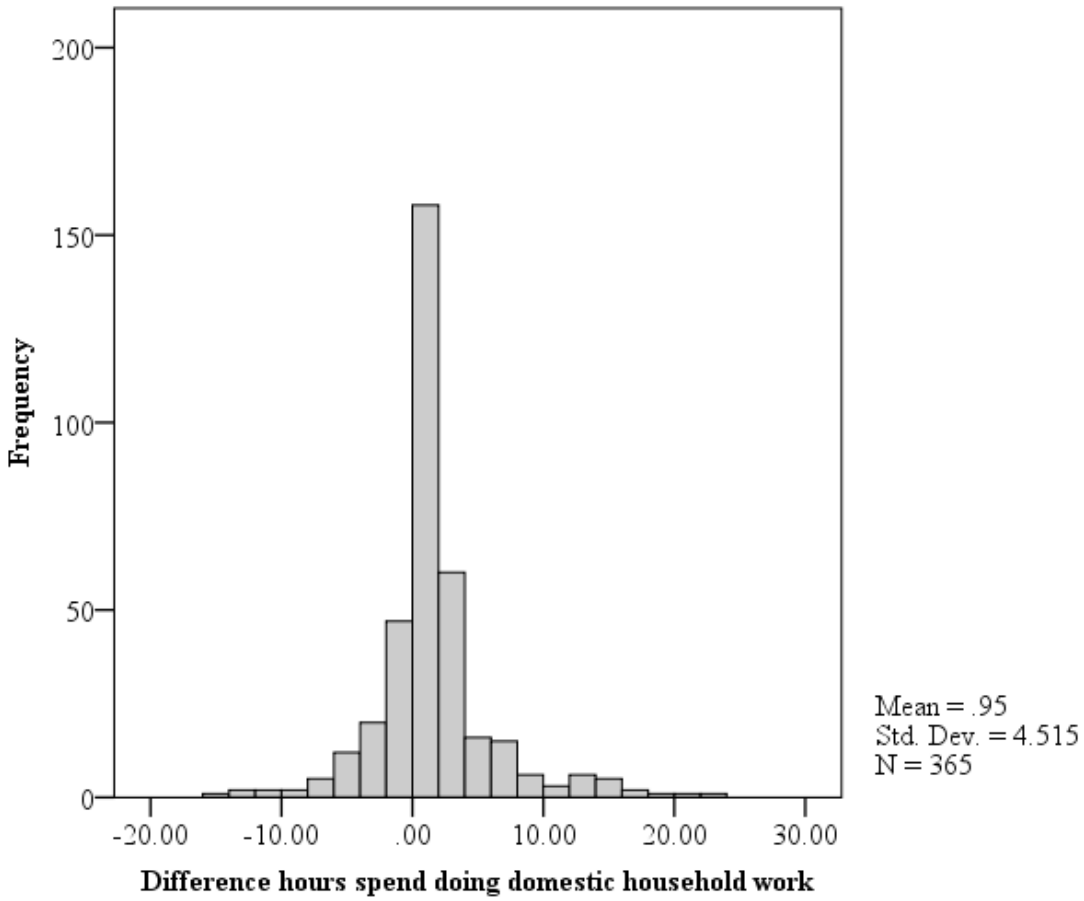
Graph B11

Histogram of Difference Score for Hours Spent Fetching Water or Wood



Graph B12

Histogram of Difference Score for Hours Spent Performing Domestic Household Work



APPENDIX C: PEARSON PRODUCT-MOMENT CORRELATION

Table C1

Correlation for Dependent Variables and Non-Orphans

Correlations

		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Age	1										
2	Household size	0.033	1									
3	Wealth	.112**	-0.023	1								
4	Age of head of household	0.016	.217**	-.152**	1							
5	Gender head of household	-0.056	-.116**	.098**	-.148**	1						
6	Gender household member	0.04	-0.031	.117**	-0.051	0.025	1					
7	How related	-.190**	-.068*	-.081**	-0.051	.187**	-.104**	1				
8	Mosquito Net	-0.056	-0.015	.099**	-0.004	0.01	0.006	0.052	1			
9	Education in single years	.627**	-0.003	.319**	-0.042	0.045	.106**	0.031	0.037	1		
10	Hours spent fetching	.153**	0.023	-.162**	0.059	-0.061	0.004	-0.056	-0.045	-0.048	1	
11	Hours spent domestic work	.159**	0.045	-.089**	-0.008	-.074*	.089**	-.107**	-0.004	0.037	.477**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table C2

Correlation for Dependent Variables and Orphans

Correlations

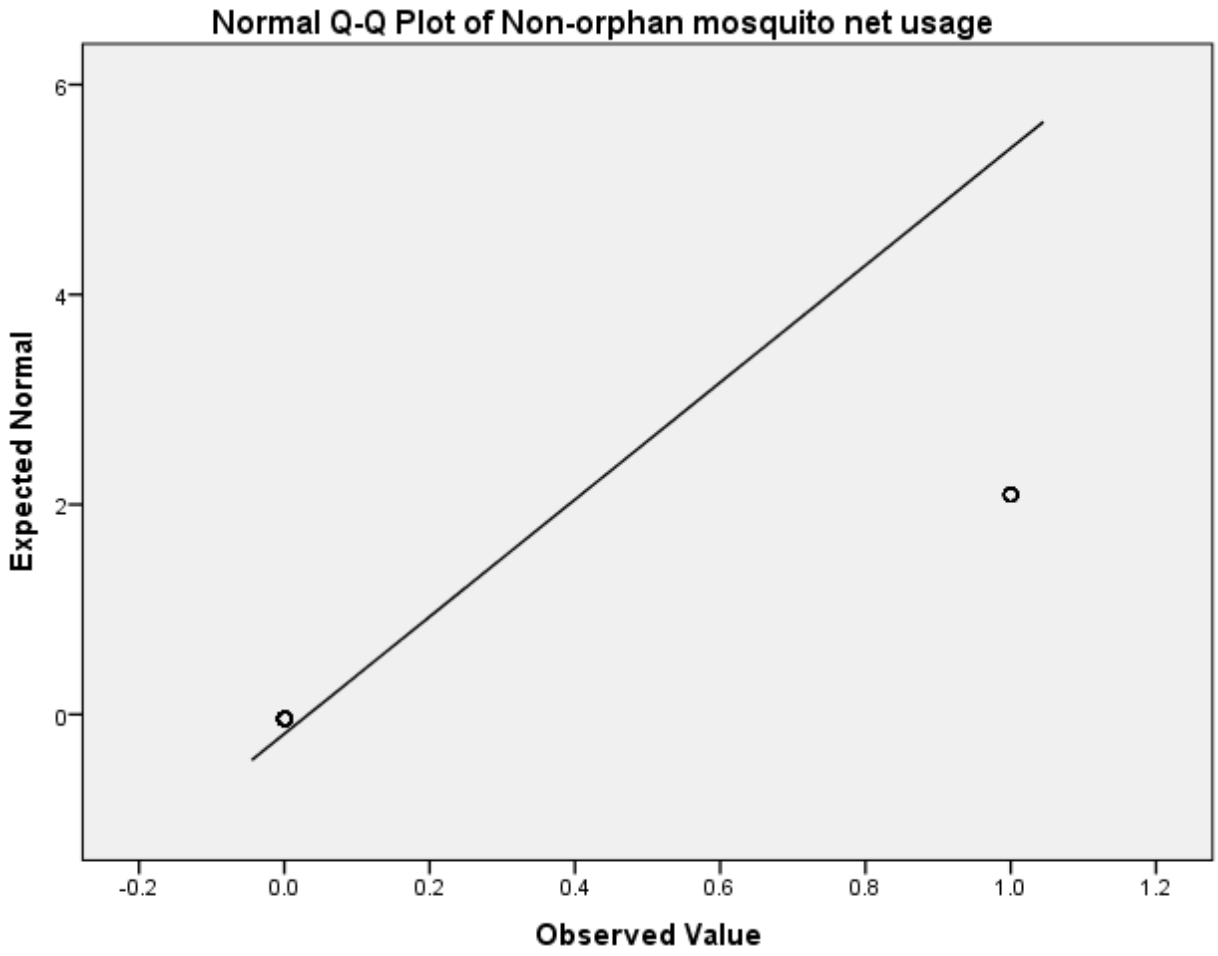
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Orphan Age	1										
2	Household size	0	1									
3	Wealth	.128**	-0.023	1								
4	Age of head of household	-0.05	.217**	-.152**	1							
5	Gender head of household	-0.056	-.116**	.098*	-.148**	1						
6	Orphan Gender	-0.007	-0.064	.109**	-0.045	-0.006	1					
7	How Related	-.124**	-0.047	-0.076	0.039	.377**	-0.075	1				
8	Mosquito Net	0.003	0.003	0.06	0.039	0.032	-0.003	0.013	1			
9	Education in single years	.548**	-0.022	.308**	-0.064	0.078	0.069	0.073	0.075	1		
10	Hours spent fetching	.189**	0.031	-.147**	0.042	-0.048	0.002	-0.059	-0.033	-0.057	1	
11	Hours spent domestic work	.150**	-0.008	-0.073	-0.058	-.093*	.112*	-.123**	0.035	0.006	.475**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

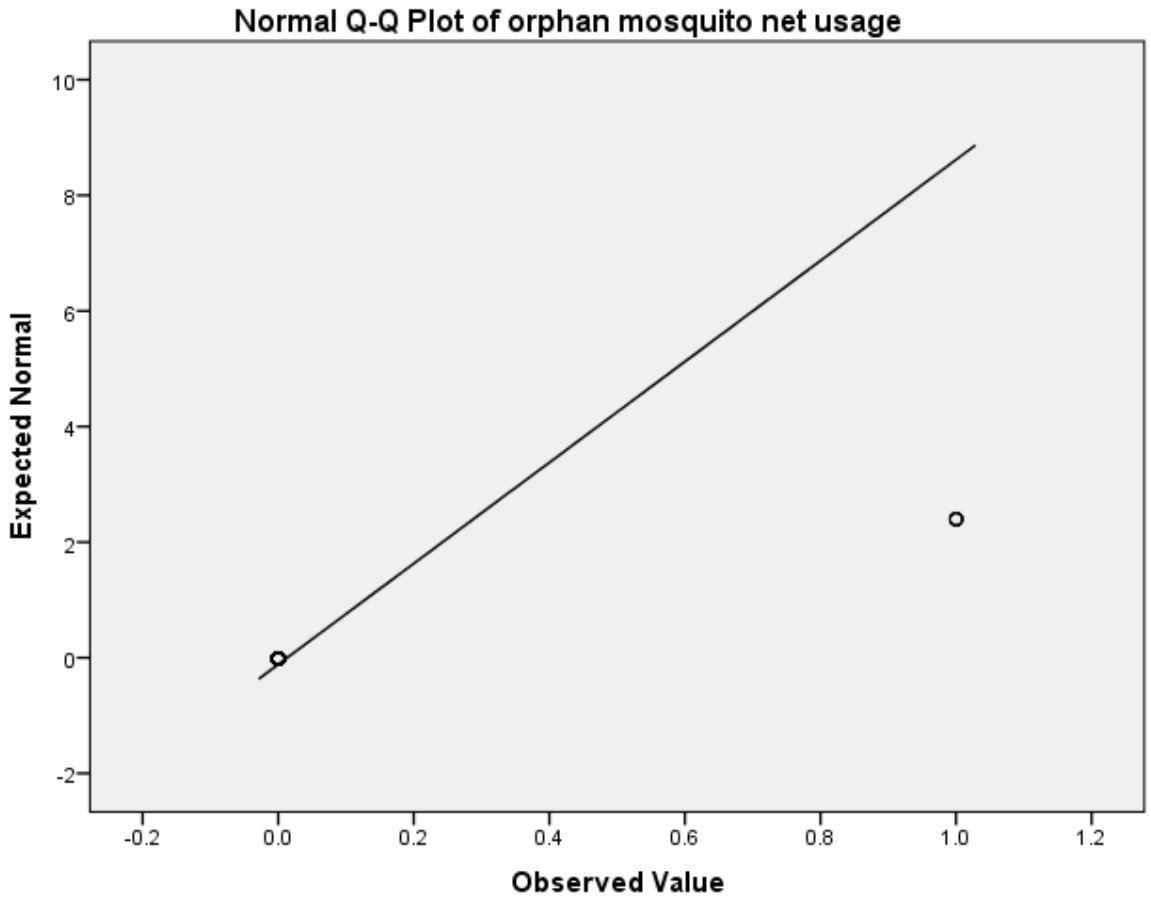
APPENDIX D: Q-Q PLOTS FOR DEPENDENT VARIABLES NON-ORPHANS AND ORPHANS

Graph D1
Q-Q Plot Mosquito Net Usage Non-Orphans



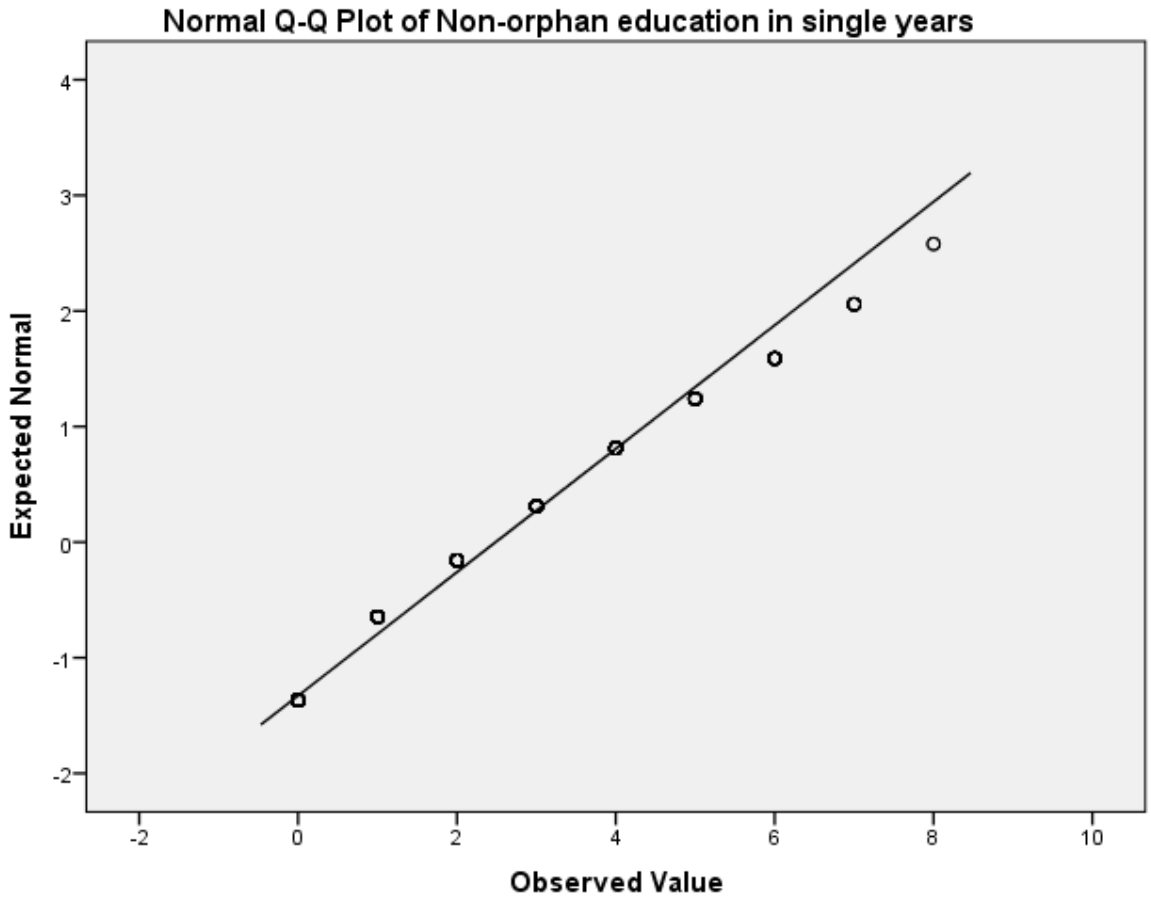
Graph D2

Q-Q Plot Mosquito Net Usage Orphans



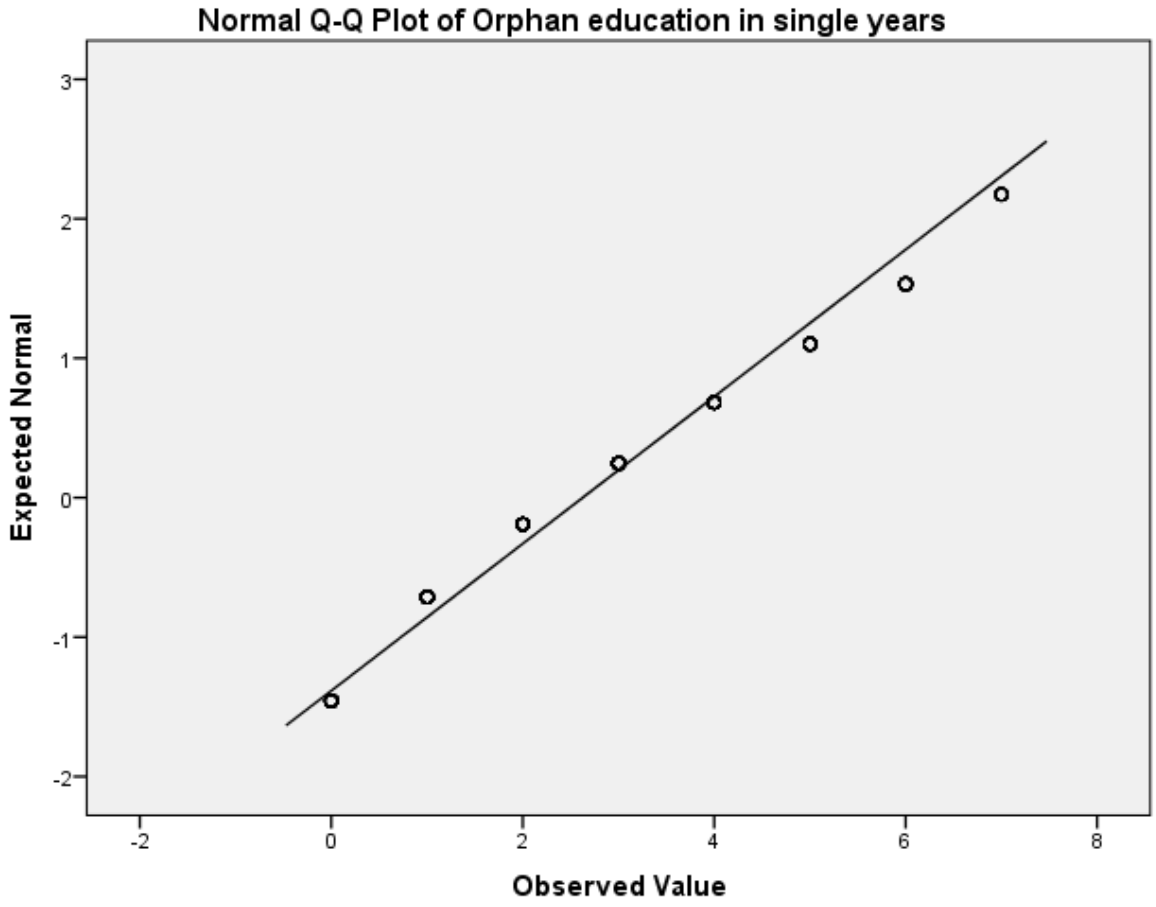
Graph D3

Q-Q Plot Years Attended School Non-Orphans



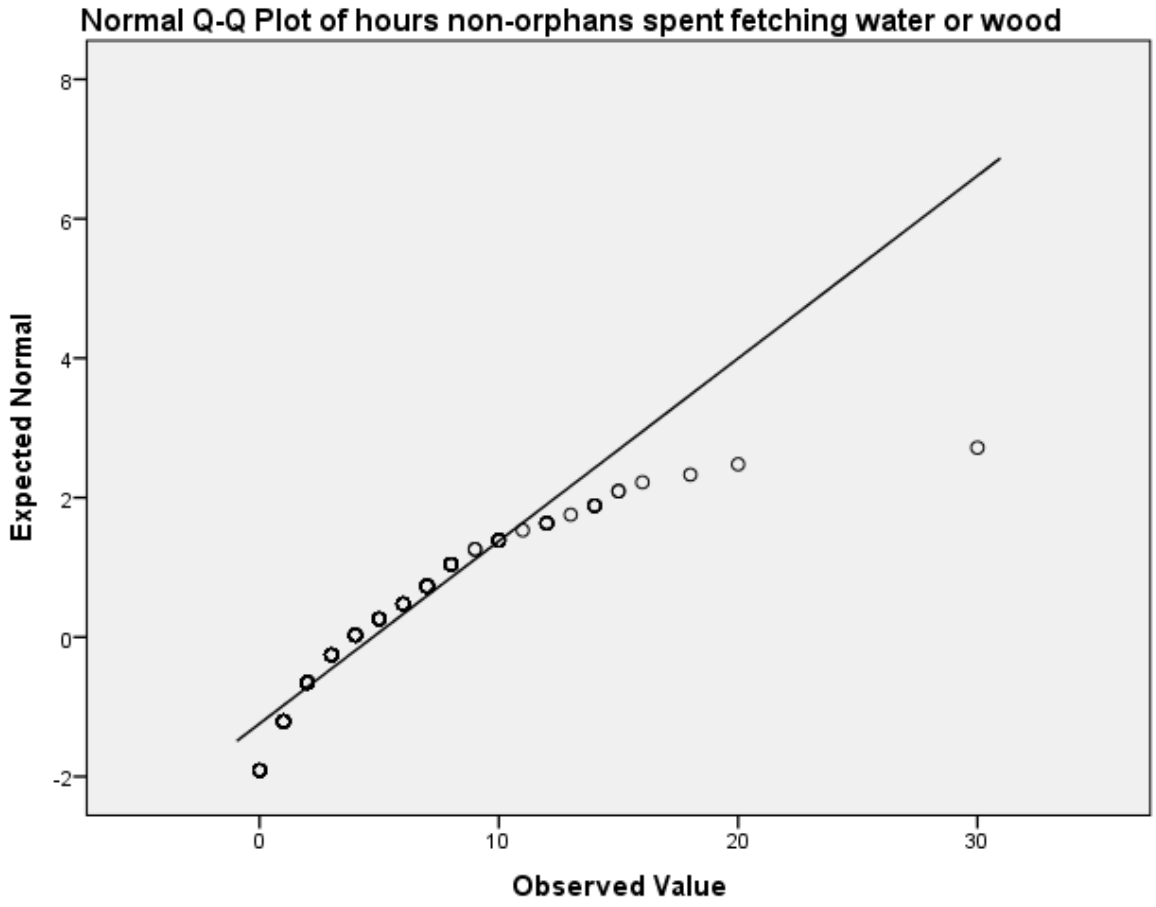
Graph D4

Q-Q Plot Years Attended School Non-Orphans



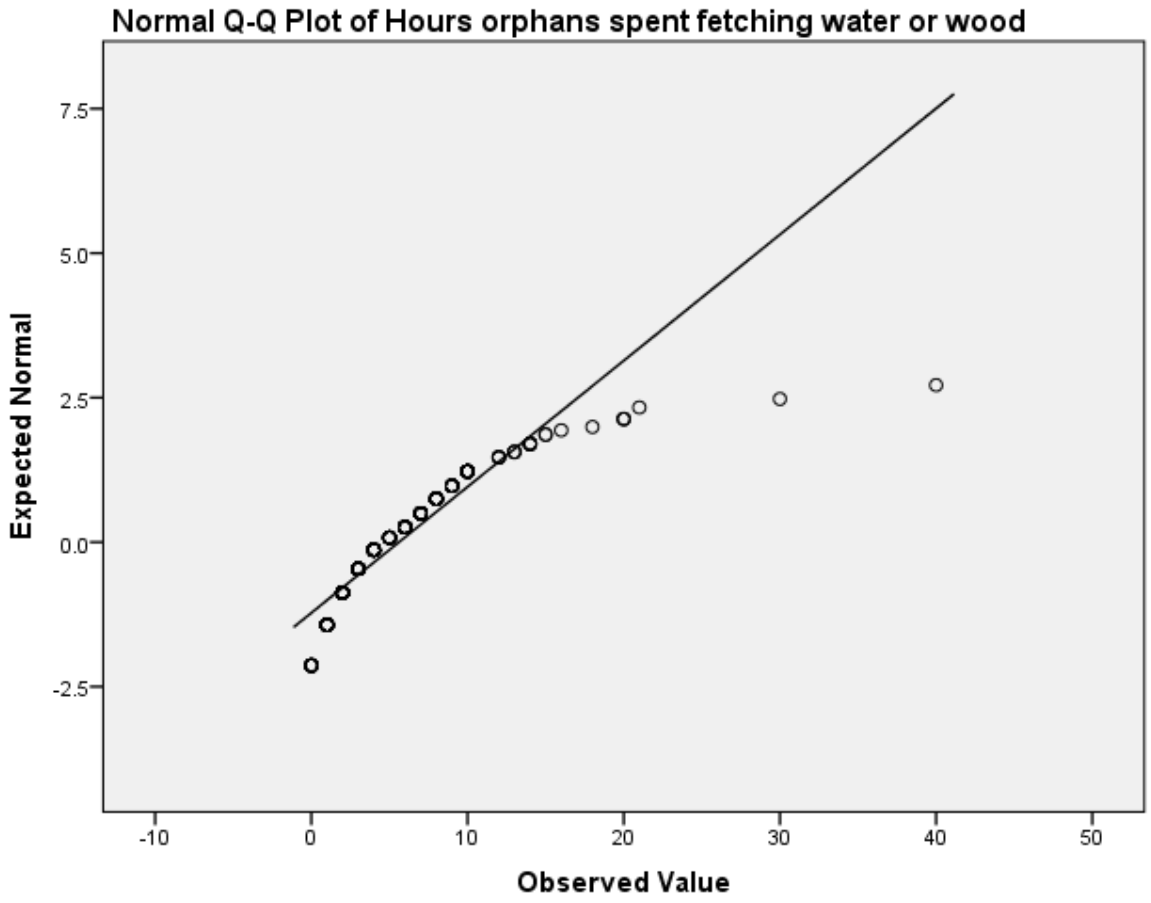
Graph D5

Q-Q Plot Hours Spent Fetching Water or Wood Non-Orphans



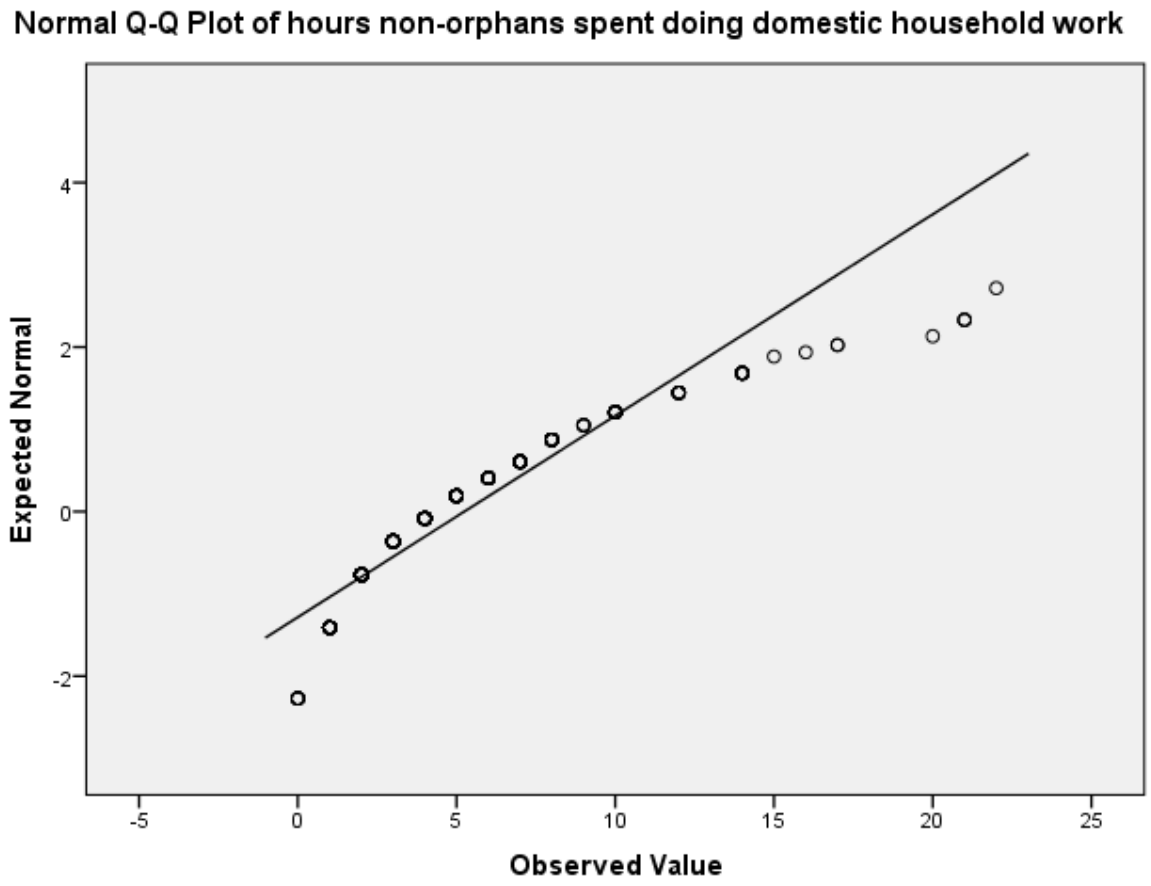
Graph D6

Q-Q Plot Hours Spent Fetching Water or Wood Orphans



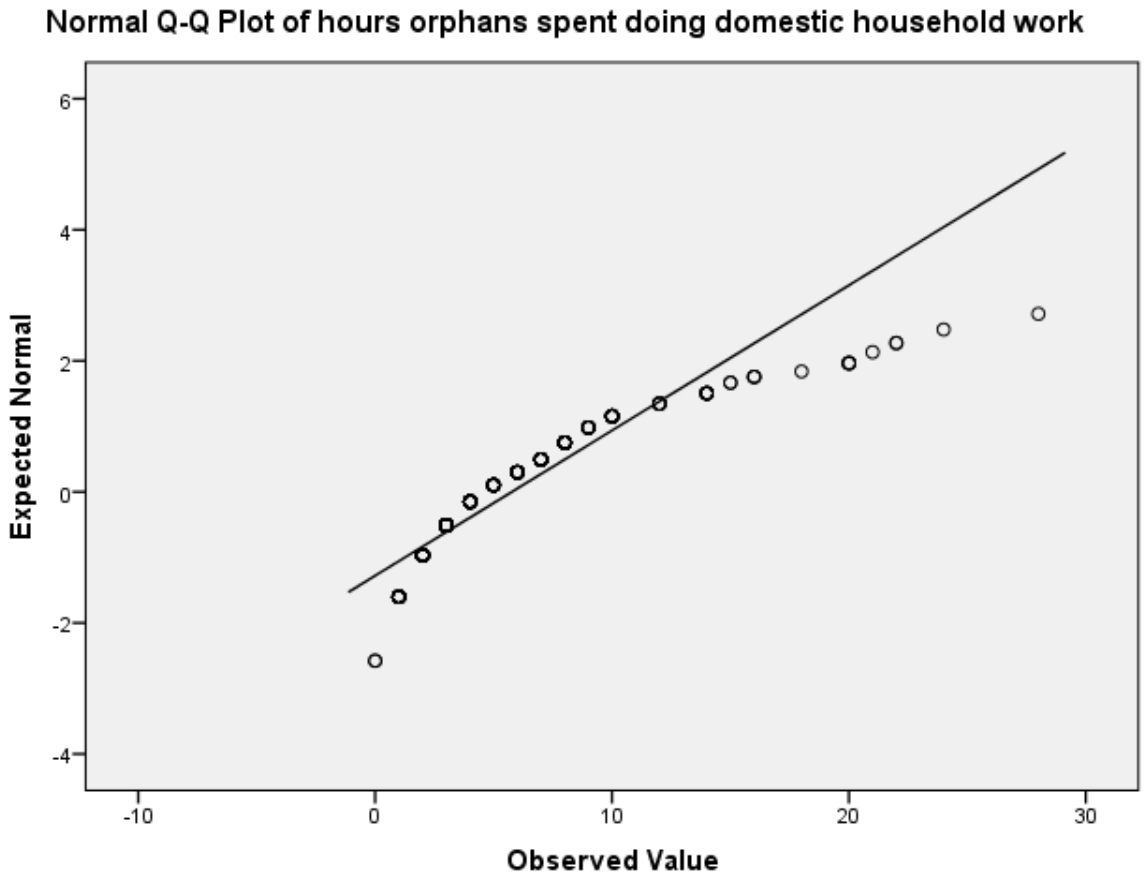
Graph D7

Q-Q Plot Hours Spent Performing Domestic Household Work Non-Orphans



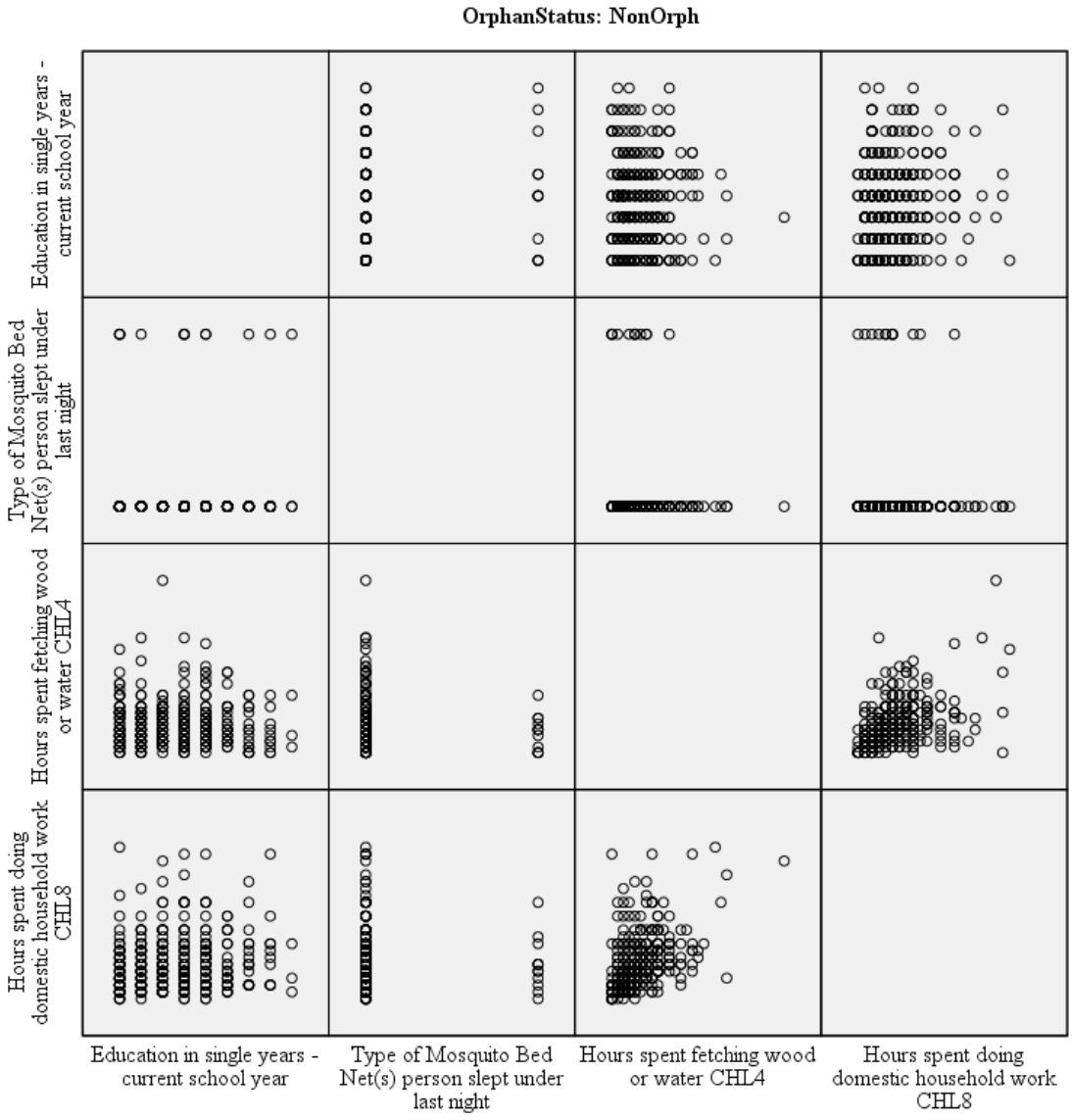
Graph D8

Q-Q Plot Hours Spent Performing Domestic Household Work Orphans



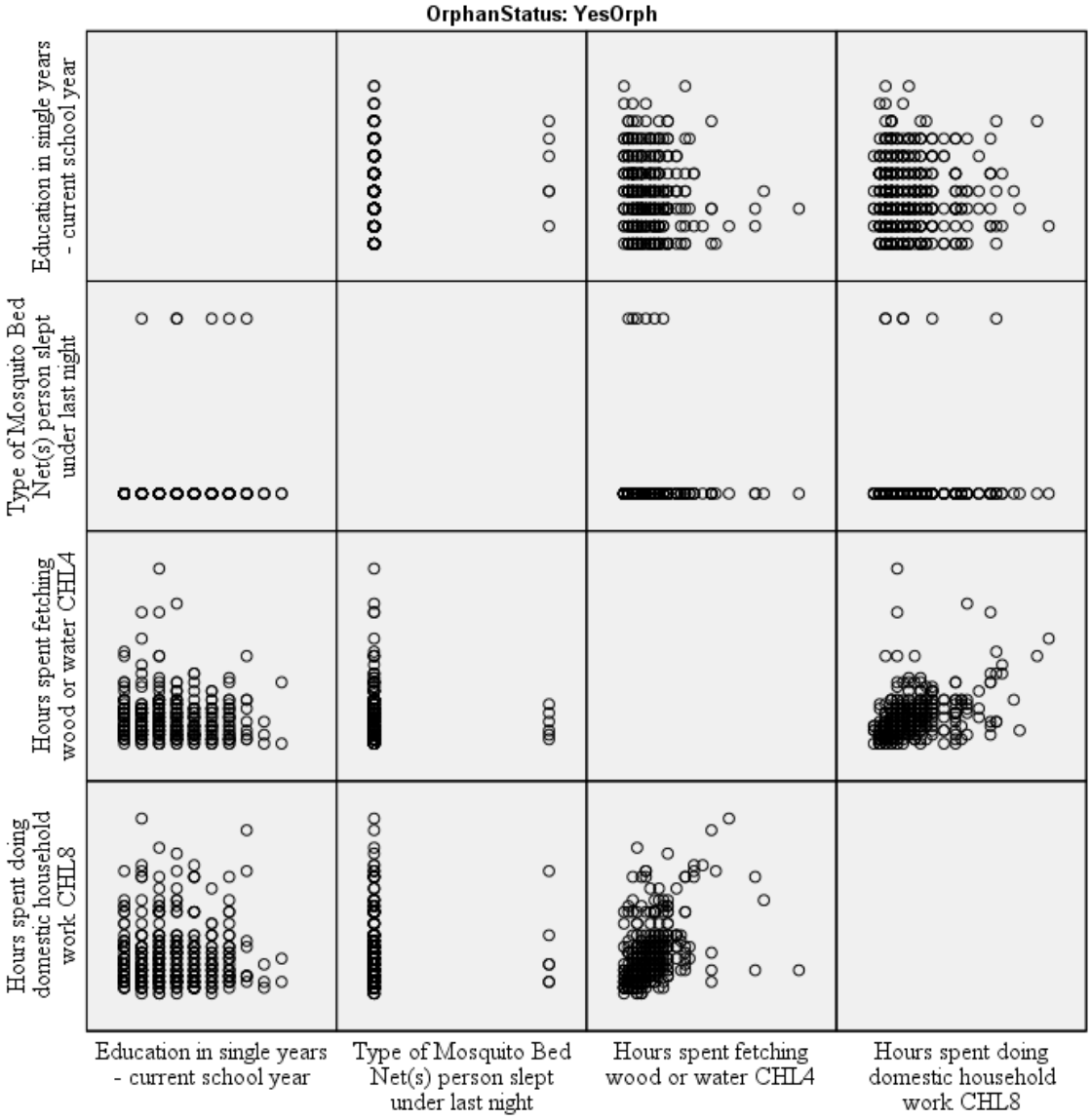
APPENDIX E: SCATTERPLOTS FOR DEPENDENT VARIABLES NON-ORPHANS AND ORPHANS

Graph E1
Scatterplot for Dependent Variables Non-orphans



Graph E2

Scatterplot for Dependent Variables Orphans



APPENDIX F: INDEPENDENT SAMPLES T-TEST FOR ORPHAN AND NON-ORPHAN AGE

Table F1

Group Statistics

OrphanStatus		N	Mean	SD	SE
Age of household members	NonOrph	610	9.16	2.79	0.11
	YesOrph	610	10.69	2.57	0.10

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% CI	
		F	Sig.	t	df	Sig.	Mean Difference	S.E. Difference	LU	UL
Age of household members	Equal variances assumed	8.77	0.00	-10.00	1218.00	0.00	-1.54	0.15	-1.84	-1.23
	Equal variances not assumed			-10.00	1210.18	0.00	-1.54	0.15	-1.84	-1.23

APPENDIX G: HOUSEHOLD WEALTH FREQUENCY

Frequency of Household Wealth

	Frequency	%
Poorest	144	23.6
Poorer	134	22.0
Middle	129	21.1
Richer	111	18.2
Richest	92	15.1
Total	610	100.0

APPENDIX H: HOUSEHOLD MEMBERS DESCRIPTIVE INFORMATION

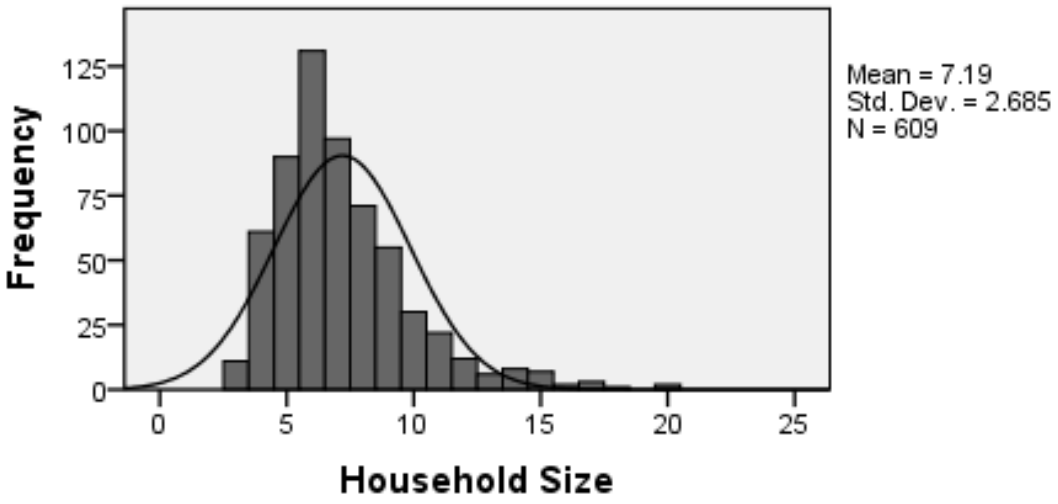
Table H1

Descriptive Information Number of Household Members

Valid	610
Missing	0
Mean	7.22
Std. Deviation	2.79
Minimum	3
Maximum	26

Graph H1

Frequency of Household Members



APPENDIX I: HEAD OF HOUSEHOLD DESCRIPTIVE INFORMATION

Table I1
Head of Household Gender

	Freq.	*%*	*Cumulative Percent*
Male	315	51.6	51.6
Female	295	48.4	100.0
Total	610	100.0	

Table I2
Head of Household Age

	n	*Min.*	*Max.*	*M*	*S.D.*
Age of head of household	610	19	86	48.04	14.40

APPENDIX J: OPRHAN AND CO-RESIDENT NON-ORPHAN EDUCATION IN SINGLE YEARS INCLUDING CURRENT

Table J1
Age of Household Members and Their Education in Single Years Including Current (2012)

		Education in single years - current school year											*Total*
		0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	
Age of household members	5	69	11	2	1	0	0	0	0	0	0	0	83
	6	46	46	8	0	0	0	0	0	0	0	0	100
	7	39	38	29	11	0	0	0	0	0	0	0	117
	8	19	37	27	22	8	0	0	0	0	0	0	113
	9	14	20	32	36	8	2	1	0	0	0	0	113
	10	11	24	37	29	17	11	0	0	0	0	0	129
	11	12	3	26	29	23	24	10	1	0	0	0	128
	12	12	15	18	35	38	14	17	10	2	0	0	161
	13	10	8	26	25	27	10	21	7	6	1	0	141
	14	10	5	18	14	21	20	18	15	4	8	1	134
Total		242	207	223	202	142	81	67	33	12	9	1	1219

APPENDIX K: HYPOTHESIS ONE: MATCHED PAIRS T-TEST FOR INTRA-HOUSEHOLD DIFFERENCES BETWEEN ORPHANS AND CO-RESIDENT NON-ORPHANS

Table K1

Paired Samples Statistics

			M	*n*	*S.D.*	*S.E.*
Pair 1	Type of mosquito bed net(s) person slept under last night	Orphan	.01	603	.115	.005
		Non-Orphan	.04	603	.200	.008
Pair 2	Education in single years	Orphan	2.64	608	2.091	.085
		Non-Orphan	2.37	608	2.033	.082
Pair 3	Hours spent fetching wood or water	Orphan	5.52	388	4.724	.240
		Non-Orphan	4.85	388	4.060	.206
Pair 4	Hours spent doing domestic household work	Orphan	5.99	365	5.030	.263
		Non-Orphan	5.04	365	3.966	.208

Table K2

Paired Samples Correlations

		n	*Correlation*	*p*
Pair 1	Person slept under mosquito net last night	603	.339	< .001
Pair 2	Education in single years including current school year	608	.209	< .001
Pair 3	Hours spent fetching wood or water	388	.730	< .001
Pair 4	Hours spent doing domestic household work	365	.517	< .001

Table K3

Paired Samples Test

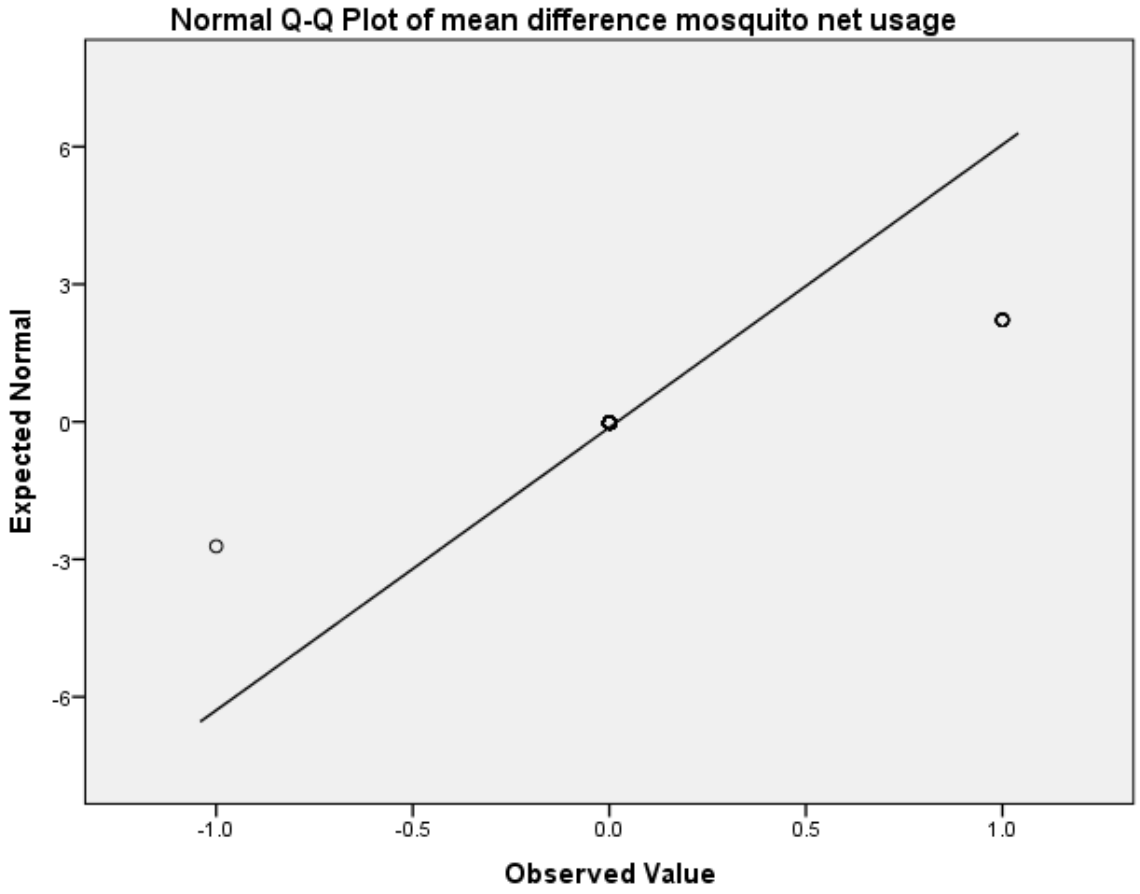
		M	*S.D.*	*S.E.*	*95% CI*		*t*	*n*	*p*
					LL	*UL*			
Pair 1	Type of mosquito bed net(s) person slept under last night	-.028	.193	.01	-.04	-.01	-3.58	602	<.001
Pair 2	Education in single years	.273	2.59	.11	.07	.48	2.60	607	.010
Pair 3	Hours spent fetching wood or water	.675	3.29	.17	.35	1.00	4.05	387	<.001
Pair 4	Hours spent doing domestic household work	.951	4.52	.24	.49	1.42	4.02	364	<.001

Note: *95% Confidence interval of the difference*

APPENDIX L: Q-Q PLOTS OF DIFFERENCE SCORE DEPENDENT VARIABLES

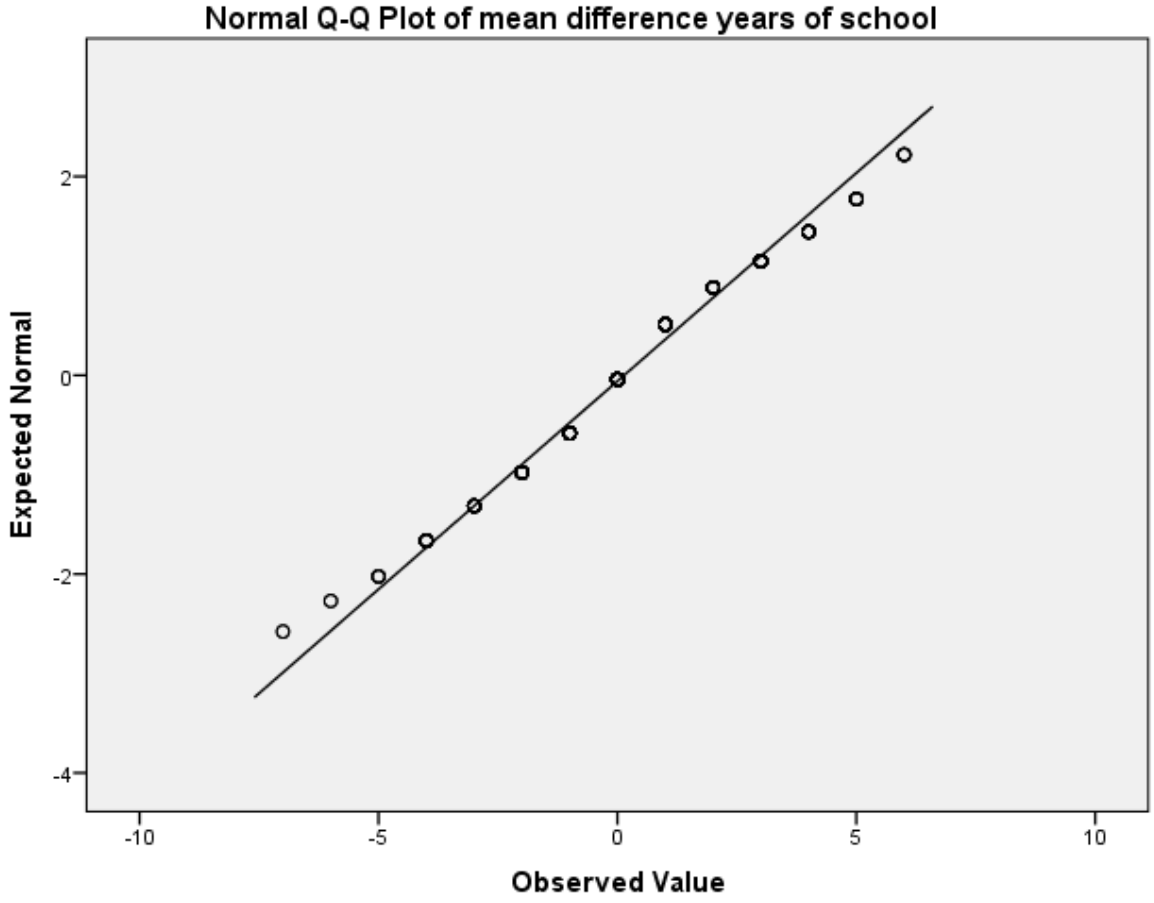
Graph L1

Q-Q Plot Difference in Mosquito Net Usage



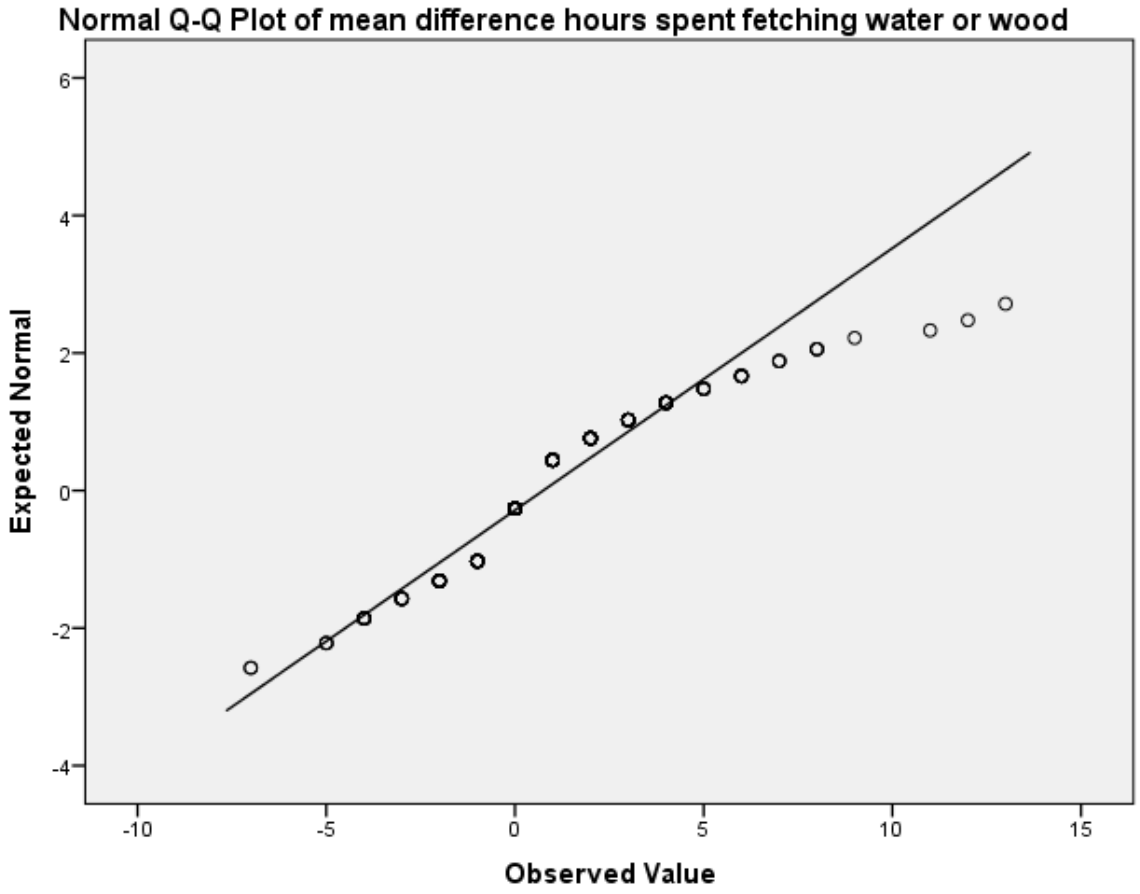
Graph L2

Q-Q Plot Difference in Years Attended School



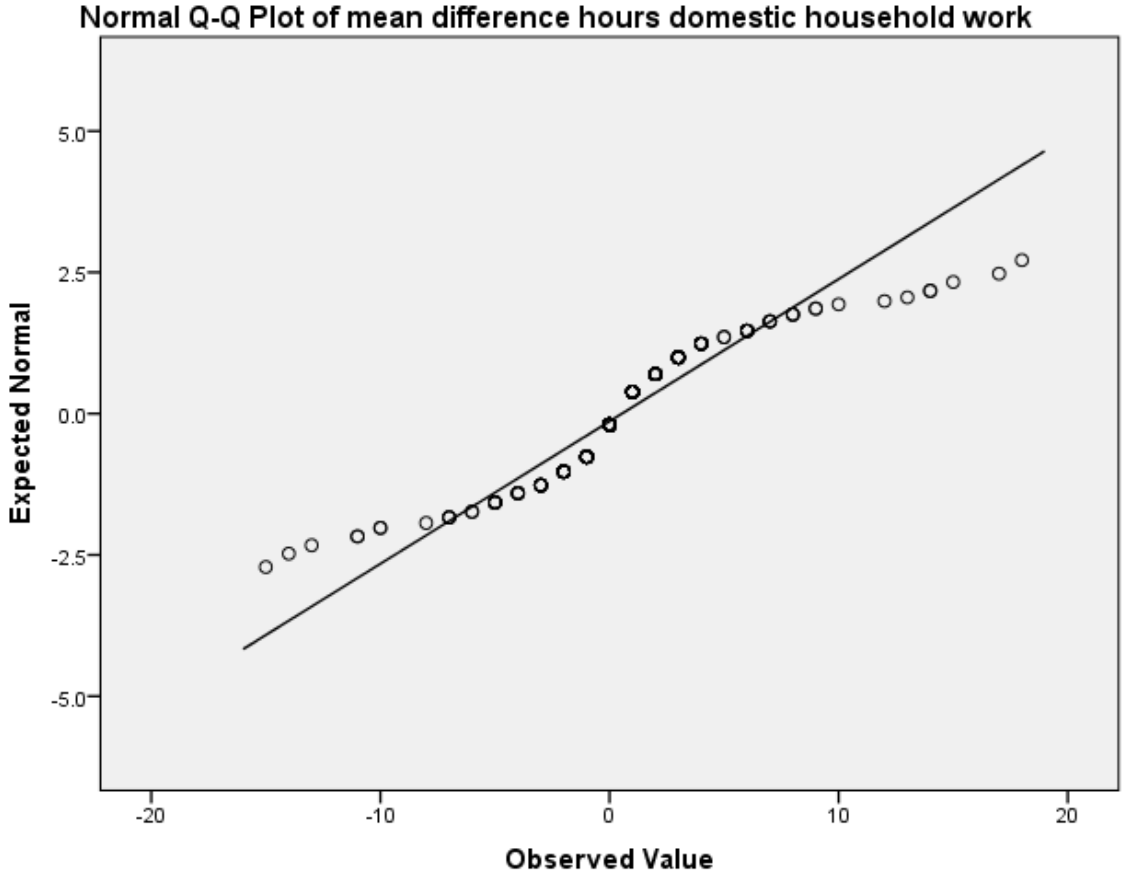
Graph L3

Q-Q Plot Difference in Hours Spent Fetching Water or Wood



Graph L4

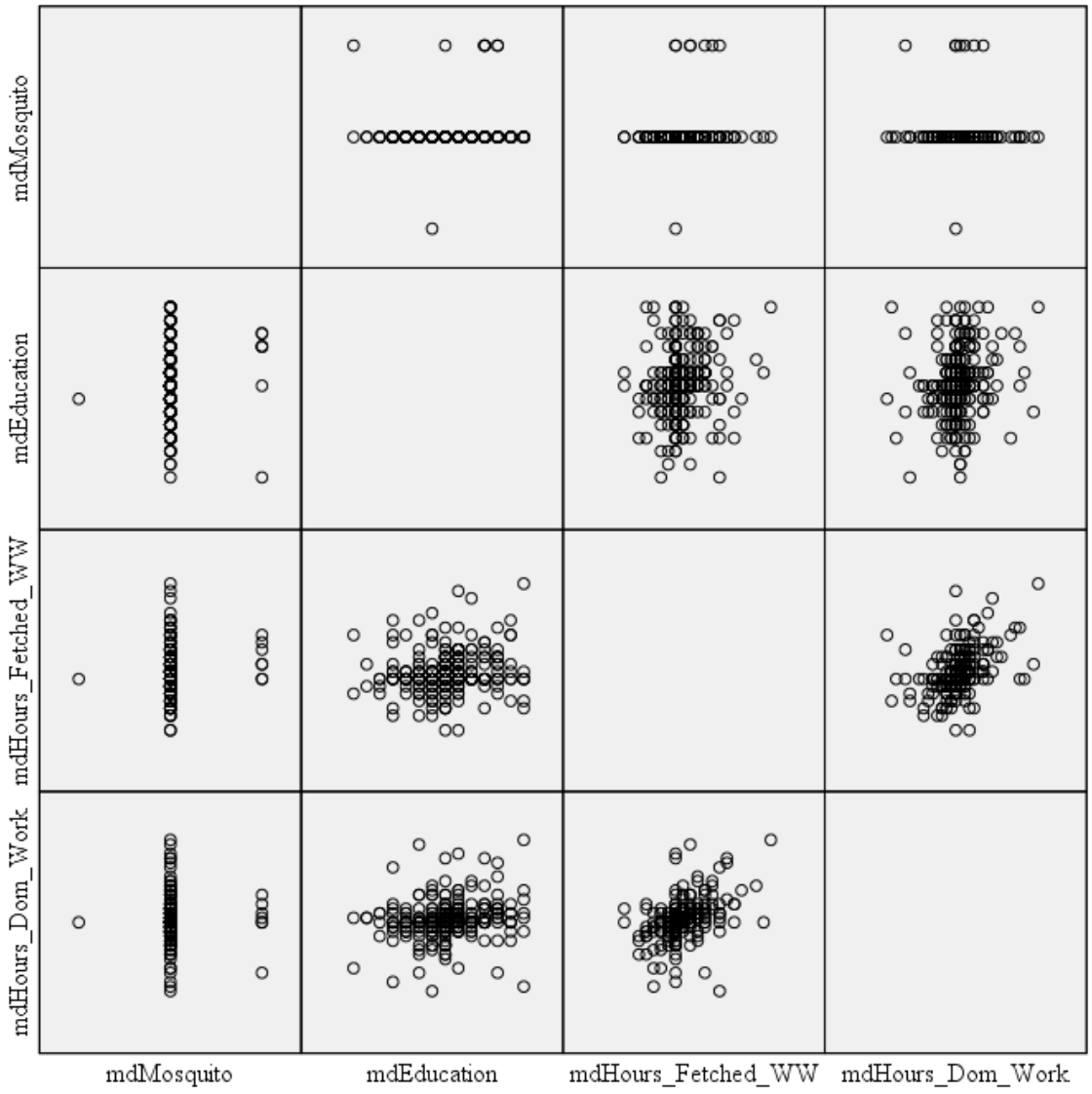
Q-Q Plot Difference in Hours Spent Performing Domestic Household Work



APPENDIX M: SCATTERPLOTS OF DIFFERENCE SCORE DEPENDENT VARIABLES

Graph M1

Scatterplot Difference



APPENDIX N: KOLMOGOROV-SMIRNOV TEST OF NORMALITY

Table N1
Kolmogorov-Smirnov Test of Normality on Difference Score Dependent Variables

Tests of Normality

	Kolmogorov-Smirnov[a]			*Shapiro-Wilk*		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
dMosquito	.526	301	.000	.163	301	.000
dEducation	.138	301	.000	.967	301	.000
dHours_Fetched_WW	.221	301	.000	.877	301	.000
dHours_Dom_Work	.190	301	.000	.864	301	.000

[a] Lilliefors Significance Correction.

APPENDIX O: HYPOTHESIS TWO: MANCOVA MODEL HOUSEHOLD SIZE

Table O1

Hypothesis Two: MANCOVA Household Size

Multivariate Tests[a]

Effect		*Value*	*F*	*Hypothesis df*	*Error df*	*Sig.*	*Eta-sqr*	*Noncent. Parameter*	*Observed Power[c]*
Intercept	Pillai's Trace	.093	7.563[b]	4	294	.000	.093	30.250	.997
	Wilks' Lambda	.907	7.563[b]	4	294	.000	.093	30.250	.997
	Hotelling's Trace	.103	7.563[b]	4	294	.000	.093	30.250	.997
	Roy's Largest Root	.103	7.563[b]	4	294	.000	.093	30.250	.997
orAge	Pillai's Trace	.162	14.233[b]	4	294	.000	.162	56.932	1.000
	Wilks' Lambda	.838	14.233[b]	4	294	.000	.162	56.932	1.000
	Hotelling's Trace	.194	14.233[b]	4	294	.000	.162	56.932	1.000
	Roy's Largest Root	.194	14.233[b]	4	294	.000	.162	56.932	1.000
orHSize	Pillai's Trace	.019	1.451[b]	4	294	.217	.019	5.805	.449
	Wilks' Lambda	.981	1.451[b]	4	294	.217	.019	5.805	.449
	Hotelling's Trace	.020	1.451[b]	4	294	.217	.019	5.805	.449
	Roy's Largest Root	.020	1.451[b]	4	294	.217	.019	5.805	.449

[a] Design: Intercept + orAge + orHSize. [b] Exact statistic. [c] Computed using alpha = .05.

Table O2

Hypothesis Two: ANCOVA Household Size

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[e]
Corrected Model	dMosquito	.015[a]	2	.008	.285	.752	.002	.570	.095
	dEducation	222.683[b]	2	111.341	22.283	.000	.130	44.567	1.000
	dHours_Fetched_WW	99.214[c]	2	49.607	7.492	.001	.048	14.984	.942
	dHours_Dom_Work	224.489[d]	2	112.245	7.405	.001	.047	14.810	.939
Intercept	dMosquito	.010	1	.010	.389	.533	.001	.389	.095
	dEducation	124.433	1	124.433	24.904	.000	.077	24.904	.999
	dHours_Fetched_WW	36.543	1	36.543	5.519	.019	.018	5.519	.649
	dHours_Dom_Work	23.317	1	23.317	1.538	.216	.005	1.538	.235
orAge	dMosquito	.001	1	.001	.035	.853	.000	.035	.054
	dEducation	220.018	1	220.018	44.034	.000	.129	44.034	1.000
	dHours_Fetched_WW	99.075	1	99.075	14.963	.000	.048	14.963	.971
	dHours_Dom_Work	162.148	1	162.148	10.697	.001	.035	10.697	.903
HSize	dMosquito	.014	1	.014	.524	.470	.002	.524	.111
	dEducation	1.186	1	1.186	.237	.626	.001	.237	.077
	dHours_Fetched_WW	.542	1	.542	.082	.775	.000	.082	.059
	dHours_Dom_Work	55.132	1	55.132	3.637	.057	.012	3.637	.477

Error	dMosquito	7.865	297	.026
	dEducation	1483.984	297	4.997
	dHours_Fetched_WW	1966.533	297	6.621
	dHours_Dom_Work	4501.858	297	15.158
Total	dMosquito	8.000	300	
	dEducation	1712.000	300	
	dHours_Fetched_WW	2236.000	300	
	dHours_Dom_Work	4816.000	300	
Corrected Total	dMosquito	7.880	299	
	dEducation	1706.667	299	
	dHours_Fetched_WW	2065.747	299	
	dHours_Dom_Work	4726.347	299	

[a] R Squared = .002 (Adjusted R Squared = -.005). [b] R Squared = .130 (Adjusted R Squared = .125). [c] R Squared = .048 (Adjusted R Squared = .042). [d] R Squared = .047 (Adjusted R Squared = .041). [e] Computed using alpha = .05.

Table O3
Parameter Estimate Hypothesis Two

Parameter Estimates

Dependent Variable	Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
						LL	*UL*			
dMosquito	Intercept	.031	.049	.624	.533	-.066	.128	.001	.624	.095
	orAge	.001	.004	.186	.853	-.007	.008	.000	.186	.054
	HSize	-.003	.003	-.724	.470	-.009	.004	.002	.724	.111
dEducation	Intercept	-3.380	.677	-4.990	.000	-4.712	-2.047	.077	4.990	.999
	orAge	.342	.052	6.636	.000	.241	.444	.129	6.636	1.000
	HSize	-.023	.048	-.487	.626	-.117	.071	.001	.487	.077
dHours_Fetched_WW	Intercept	-1.831	.780	-2.349	.019	-3.366	-.297	.018	2.349	.649
	orAge	.230	.059	3.868	.000	.113	.347	.048	3.868	.971
	HSize	.016	.055	.286	.775	-.092	.124	.000	.286	.059
dHours_Dom_Work	Intercept	-1.463	1.180	-1.240	.216	-3.784	.858	.005	1.240	.235
	orAge	.294	.090	3.271	.001	.117	.471	.035	3.271	.903
	HSize	-.158	.083	-1.907	.057	-.322	.005	.012	1.907	.477

[a] Computed using alpha = .05.

APPENDIX P: HYPOTHESIS THREE: MANCOVA MODEL HOUSEHOLD WEALTH

Table P1
Hypothesis Three: MANCOVA Household Wealth

Multivariate Tests[a]

Effect		*Value*	*F*	*Hypothesis df*	*Error df*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power[c]*
Intercept	Pillai's Trace	.098	8.037[b]	4	295	.000	.098	32.146	.998
	Wilks' Lambda	.902	8.037[b]	4	295	.000	.098	32.146	.998
	Hotelling's Trace	.109	8.037[b]	4	295	.000	.098	32.146	.998
	Roy's Largest Root	.109	8.037[b]	4	295	.000	.098	32.146	.998
orAge	Pillai's Trace	.170	15.087[b]	4	295	.000	.170	60.350	1.000
	Wilks' Lambda	.830	15.087[b]	4	295	.000	.170	60.350	1.000
	Hotelling's Trace	.205	15.087[b]	4	295	.000	.170	60.350	1.000
	Roy's Largest Root	.205	15.087[b]	4	295	.000	.170	60.350	1.000
HWealth	Pillai's Trace	.018	1.334[b]	4	295	.257	.018	5.337	.415
	Wilks' Lambda	.982	1.334[b]	4	295	.257	.018	5.337	.415
	Hotelling's Trace	.018	1.334[b]	4	295	.257	.018	5.337	.415
	Roy's Largest Root	.018	1.334[b]	4	295	.257	.018	5.337	.415

[a] Design: Intercept + orAge + HWealth. [b] Exact statistic. [c] Computed using alpha = .05.

Table P2
Hypothesis Three: ANCOVA Household Wealth

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[e]
Corrected Model	dMosquito	.020[a]	2	.010	.370	.691	.002	.740	.109
	dEducation	240.572[b]	2	120.286	24.392	.000	.141	48.783	1.000
	dHours_Fetched_WW	101.447[c]	2	50.724	7.693	.001	.049	15.386	.947
	dHours_Dom_Work	179.567[d]	2	89.783	5.884	.003	.038	11.768	.873
Intercept	dMosquito	1.592E-005	1	1.592E-005	.001	.980	.000	.001	.050
	dEducation	135.876	1	135.876	27.553	.000	.085	27.553	.999
	dHours_Fetched_WW	33.038	1	33.038	5.011	.026	.017	5.011	.607
	dHours_Dom_Work	77.728	1	77.728	5.094	.025	.017	5.094	.614
orAge	dMosquito	.001	1	.001	.023	.880	.000	.023	.053
	dEducation	230.080	1	230.080	46.656	.000	.135	46.656	1.000
	dHours_Fetched_WW	100.512	1	100.512	15.244	.000	.049	15.244	.973
	dHours_Dom_Work	174.478	1	174.478	11.435	.001	.037	11.435	.921
HWealth	dMosquito	.018	1	.018	.695	.405	.002	.695	.132
	dEducation	18.764	1	18.764	3.805	.052	.013	3.805	.494
	dHours_Fetched_WW	2.865	1	2.865	.434	.510	.001	.434	.101
	dHours_Dom_Work	10.297	1	10.297	.675	.412	.002	.675	.130

Error	dMosquito	7.861	298	.026
	dEducation	1469.568	298	4.931
	dHours_Fetched_WW	1964.865	298	6.594
	dHours_Dom_Work	4547.078	298	15.259
Total	dMosquito	8.000	301	
	dEducation	1716.000	301	
	dHours_Fetched_WW	2236.000	301	
	dHours_Dom_Work	4816.000	301	
Corrected Total	dMosquito	7.880	300	
	dEducation	1710.140	300	
	dHours_Fetched_WW	2066.312	300	
	dHours_Dom_Work	4726.645	300	

[a] R Squared = .002 (Adjusted R Squared = -.004). [b] R Squared = .141 (Adjusted R Squared = .135). [c] R Squared = .049 (Adjusted R Squared = .043). [d] R Squared = .038 (Adjusted R Squared = .032). [e] Computed using alpha = .05.

Table P3

Hypothesis Three: Parameter Estimate Household Wealth

Parameter Estimates

Dependent Variable	Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
						LL	*UL*			
dMosquito	Intercept	-.001	.044	-.025	.980	-.088	.085	.000	.025	.050
	orAge	.001	.004	.151	.880	-.007	.008	.000	.151	.053
	HWealth	.006	.007	.834	.405	-.008	.020	.002	.834	.132
dEducation	Intercept	-3.156	.601	-5.249	.000	-4.340	-1.973	.085	5.249	.999
	orAge	.351	.051	6.831	.000	.250	.452	.135	6.831	1.000
	HWealth	-.192	.098	-1.951	.052	-.386	.002	.013	1.951	.494
dHours_Fetched_WW	Intercept	-1.556	.695	-2.238	.026	-2.925	-.188	.017	2.238	.607
	orAge	.232	.059	3.904	.000	.115	.349	.049	3.904	.973
	HWealth	-.075	.114	-.659	.510	-.299	.149	.001	.659	.101
dHours_Dom_Work	Intercept	-2.387	1.058	-2.257	.025	-4.469	-.306	.017	2.257	.614
	orAge	.306	.090	3.382	.001	.128	.483	.037	3.382	.921
	HWealth	-.142	.173	-.821	.412	-.483	.199	.002	.821	.130

[a] Computed using alpha = .05

APPENDIX Q: HYPOTHESIS FOUR: MANCOVA MODEL HEAD OF HOUSEHOLD AGE

Table Q1
Hypothesis Four: MANCOVA Head of Household Age

Multivariate Tests[a]

Effect		*Value*	*F*	*Hypothesis df*	*Error df*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power[c]*
Intercept	Pillai's Trace	.078	6.241[b]	4	295	.000	.078	24.964	.988
	Wilks' Lambda	.922	6.241[b]	4	295	.000	.078	24.964	.988
	Hotelling's Trace	.085	6.241[b]	4	295	.000	.078	24.964	.988
	Roy's Largest Root	.085	6.241[b]	4	295	.000	.078	24.964	.988
orAge	Pillai's Trace	.158	13.864[b]	4	295	.000	.158	55.455	1.000
	Wilks' Lambda	.842	13.864[b]	4	295	.000	.158	55.455	1.000
	Hotelling's Trace	.188	13.864[b]	4	295	.000	.158	55.455	1.000
	Roy's Largest Root	.188	13.864[b]	4	295	.000	.158	55.455	1.000
HHAge	Pillai's Trace	.018	1.350[b]	4	295	.251	.018	5.401	.420
	Wilks' Lambda	.982	1.350[b]	4	295	.251	.018	5.401	.420
	Hotelling's Trace	.018	1.350[b]	4	295	.251	.018	5.401	.420
	Roy's Largest Root	.018	1.350[b]	4	295	.251	.018	5.401	.420

[a] Design: Intercept + orAge + HHAge. [b] Exact statistic. [c] Computed using alpha = .05.

Table Q2

Hypothesis Four: ANCOVA Head of Household Age

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[e]
Corrected Model	dMosquito	.065[a]	2	.033	1.244	.290	.008	2.488	.270
	dEducation	221.844[b]	2	110.922	22.210	.000	.130	44.420	1.000
	dHours_Fetched_WW	106.832[c]	2	53.416	8.124	.000	.052	16.247	.958
	dHours_Dom_Work	211.053[d]	2	105.526	6.964	.001	.045	13.928	.924
Intercept	dMosquito	.041	1	.041	1.545	.215	.005	1.545	.236
	dEducation	106.512	1	106.512	21.327	.000	.067	21.327	.996
	dHours_Fetched_WW	9.774	1	9.774	1.486	.224	.005	1.486	.229
	dHours_Dom_Work	12.928	1	12.928	.853	.356	.003	.853	.151
orAge	dMosquito	6.607E-006	1	6.607E-006	.000	.987	.000	.000	.050
	dEducation	217.636	1	217.636	43.577	.000	.128	43.577	1.000
	dHours_Fetched_WW	90.092	1	90.092	13.701	.000	.044	13.701	.958
	dHours_Dom_Work	146.405	1	146.405	9.662	.002	.031	9.662	.873
HHAge	dMosquito	.064	1	.064	2.442	.119	.008	2.442	.344
	dEducation	.036	1	.036	.007	.932	.000	.007	.051
	dHours_Fetched_WW	8.249	1	8.249	1.255	.264	.004	1.255	.201
	dHours_Dom_Work	41.783	1	41.783	2.757	.098	.009	2.757	.380

Error	dMosquito	7.815	298	.026
	dEducation	1488.295	298	4.994
	dHours_Fetched_WW	1959.481	298	6.575
	dHours_Dom_Work	4515.592	298	15.153
Total	dMosquito	8.000	301	
	dEducation	1716.000	301	
	dHours_Fetched_WW	2236.000	301	
	dHours_Dom_Work	4816.000	301	
Corrected Total	dMosquito	7.880	300	
	dEducation	1710.140	300	
	dHours_Fetched_WW	2066.312	300	
	dHours_Dom_Work	4726.645	300	

[a] R Squared = .008 (Adjusted R Squared = .002). [b] R Squared = .130 (Adjusted R Squared = .124). [c] R Squared = .052 (Adjusted R Squared = .045). [d] R Squared = .045 (Adjusted R Squared = .038). [e] Computed using alpha = .05.

APPENDIX R: HYPOTHESIS FIVE: MANCOVA MODEL HEAD OF HOUSEHOLD GENDER

Table R1
Hypothesis Five: MANCOVA Head of Household Gender

Multivariate Tests[a]

Effect		*Value*	*F*	*Hypothesis df*	*Error df*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power[c]*
Intercept	Pillai's Trace	.127	10.715[b]	4	295	.000	.127	42.861	1.000
	Wilks' Lambda	.873	10.715[b]	4	295	.000	.127	42.861	1.000
	Hotelling's Trace	.145	10.715[b]	4	295	.000	.127	42.861	1.000
	Roy's Largest Root	.145	10.715[b]	4	295	.000	.127	42.861	1.000
orAge	Pillai's Trace	.168	14.871[b]	4	295	.000	.168	59.483	1.000
	Wilks' Lambda	.832	14.871[b]	4	295	.000	.168	59.483	1.000
	Hotelling's Trace	.202	14.871[b]	4	295	.000	.168	59.483	1.000
	Roy's Largest Root	.202	14.871[b]	4	295	.000	.168	59.483	1.000
HHGender	Pillai's Trace	.013	.961[b]	4	295	.429	.013	3.845	.304
	Wilks' Lambda	.987	.961[b]	4	295	.429	.013	3.845	.304
	Hotelling's Trace	.013	.961[b]	4	295	.429	.013	3.845	.304
	Roy's Largest Root	.013	.961[b]	4	295	.429	.013	3.845	.304

[a] Design: Intercept + orAge + HHGender. [b] Exact statistic. [c] Computed using alpha = .05.

Table R2

Hypothesis Five: ANCOVA Head of Household Gender

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[e]
Corrected Model	dMosquito	.008[a]	2	.004	.151	.860	.001	.302	.073
	dEducation	234.554[b]	2	117.277	23.685	.000	.137	47.369	1.000
	dHours_Fetched_WW	98.927[c]	2	49.464	7.492	.001	.048	14.985	.942
	dHours_Dom_Work	187.818[d]	2	93.909	6.166	.002	.040	12.331	.889
Intercept	dMosquito	.007	1	.007	.271	.603	.001	.271	.081
	dEducation	178.973	1	178.973	36.144	.000	.108	36.144	1.000
	dHours_Fetched_WW	33.356	1	33.356	5.052	.025	.017	5.052	.610
	dHours_Dom_Work	122.020	1	122.020	8.011	.005	.026	8.011	.805
orAge	dMosquito	.001	1	.001	.031	.860	.000	.031	.054
	dEducation	228.139	1	228.139	46.073	.000	.134	46.073	1.000
	dHours_Fetched_WW	98.917	1	98.917	14.983	.000	.048	14.983	.971
	dHours_Dom_Work	176.273	1	176.273	11.573	.001	.037	11.573	.924
HHGender	dMosquito	.007	1	.007	.257	.613	.001	.257	.080
	dEducation	12.746	1	12.746	2.574	.110	.009	2.574	.359
	dHours_Fetched_WW	.345	1	.345	.052	.819	.000	.052	.056
	dHours_Dom_Work	18.548	1	18.548	1.218	.271	.004	1.218	.196

Error	dMosquito	7.872	298	.026
	dEducation	1475.585	298	4.952
	dHours_Fetched_WW	1967.385	298	6.602
	dHours_Dom_Work	4538.827	298	15.231
Total	dMosquito	8.000	301	
	dEducation	1716.000	301	
	dHours_Fetched_WW	2236.000	301	
	dHours_Dom_Work	4816.000	301	
Corrected Total	dMosquito	7.880	300	
	dEducation	1710.140	300	
	dHours_Fetched_WW	2066.312	300	
	dHours_Dom_Work	4726.645	300	

[a] R Squared = .001 (Adjusted R Squared = -.006). [b] R Squared = .137 (Adjusted R Squared = .131). [c] R Squared = .048 (Adjusted R Squared = .041). [d] R Squared = .040 (Adjusted R Squared = .033). [e] Computed using alpha = .05.

APPENDIX S: HYPOTHSIS SIX: MANCOVA MODEL ORPHAN GENDER

Table S1
Hypothesis Six: MANCOVA Model Orphan Gender

Multivariate Tests[a]

Effect		*Value*	*F*	*Hypothesis df*	*Error df*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power[c]*
Intercept	Pillai's Trace	.112	9.320[b]	4	295	.000	.112	37.279	1.000
	Wilks' Lambda	.888	9.320[b]	4	295	.000	.112	37.279	1.000
	Hotelling's Trace	.126	9.320[b]	4	295	.000	.112	37.279	1.000
	Roy's Largest Root	.126	9.320[b]	4	295	.000	.112	37.279	1.000
orAge	Pillai's Trace	.163	14.317[b]	4	295	.000	.163	57.267	1.000
	Wilks' Lambda	.837	14.317[b]	4	295	.000	.163	57.267	1.000
	Hotelling's Trace	.194	14.317[b]	4	295	.000	.163	57.267	1.000
	Roy's Largest Root	.194	14.317[b]	4	295	.000	.163	57.267	1.000
orGender	Pillai's Trace	.035	2.705[b]	4	295	.031	.035	10.818	.747
	Wilks' Lambda	.965	2.705[b]	4	295	.031	.035	10.818	.747
	Hotelling's Trace	.037	2.705[b]	4	295	.031	.035	10.818	.747
	Roy's Largest Root	.037	2.705[b]	4	295	.031	.035	10.818	.747

[a]Design: Intercept + orAge + orGender. [b] Exact statistic. [c] Computed using alpha = .05.

Table S2

Hypothesis Six: ANCOVA Model Orphan Gender

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[e]
Corrected Model	dMosquito	.002[a]	2	.001	.031	.970	.000	.061	.055
	dEducation	221.943[b]	2	110.972	22.221	.000	.130	44.442	1.000
	dHours_Fetched_WW	98.801[c]	2	49.400	7.482	.001	.048	14.964	.941
	dHours_Dom_Work	294.520[d]	2	147.260	9.901	.000	.062	19.802	.984
Intercept	dMosquito	.002	1	.002	.089	.765	.000	.089	.060
	dEducation	130.667	1	130.667	26.165	.000	.081	26.165	.999
	dHours_Fetched_WW	28.570	1	28.570	4.327	.038	.014	4.327	.545
	dHours_Dom_Work	223.904	1	223.904	15.054	.000	.048	15.054	.972
orAge	dMosquito	.001	1	.001	.047	.829	.000	.047	.055
	dEducation	221.934	1	221.934	44.441	.000	.130	44.441	1.000
	dHours_Fetched_WW	98.775	1	98.775	14.961	.000	.048	14.961	.971
	dHours_Dom_Work	160.219	1	160.219	10.773	.001	.035	10.773	.905
orGender	dMosquito	.000	1	.000	.016	.899	.000	.016	.052
	dEducation	.135	1	.135	.027	.870	.000	.027	.053
	dHours_Fetched_WW	.218	1	.218	.033	.856	.000	.033	.054
	dHours_Dom_Work	125.249	1	125.249	8.421	.004	.027	8.421	.824

Error	dMosquito	7.879	298	.026
	dEducation	1488.196	298	4.994
	dHours_Fetched_WW	1967.512	298	6.602
	dHours_Dom_Work	4432.125	298	14.873
Total	dMosquito	8.000	301	
	dEducation	1716.000	301	
	dHours_Fetched_WW	2236.000	301	
	dHours_Dom_Work	4816.000	301	
Corrected Total	dMosquito	7.880	300	
	dEducation	1710.140	300	
	dHours_Fetched_WW	2066.312	300	
	dHours_Dom_Work	4726.645	300	

[a] R Squared = .000 (Adjusted R Squared = -.007). [b] R Squared = .130 (Adjusted R Squared = .124). [c] R Squared = .048 (Adjusted R Squared = .041). [d] R Squared = .062 (Adjusted R Squared = .056). [e] Computed using alpha = .05.

Table S3

Hypothesis Six: Parameter Estimate Orphan Gender

Parameter Estimates

Dependent Variable	Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
						LL	*UL*			
dMosquito	Intercept	.015	.050	.299	.765	-.083	.113	.000	.299	.060
	orAge	.001	.004	.216	.829	-.007	.008	.000	.216	.055
	orGender	-.002	.019	-.127	.899	-.039	.035	.000	.127	.052
dEducation	Intercept	-3.493	.683	-5.115	.000	-4.837	-2.149	.081	5.115	.999
	orAge	.344	.052	6.666	.000	.242	.445	.130	6.666	1.000
	orGender	-.042	.258	-.164	.870	-.550	.466	.000	.164	.053
dHours_Fetched_WW	Intercept	-1.633	.785	-2.080	.038	-3.178	-.088	.014	2.080	.545
	orAge	.229	.059	3.868	.000	.113	.346	.048	3.868	.971
	orGender	-.054	.297	-.182	.856	-.638	.530	.000	.182	.054
dHours_Dom_Work	Intercept	-4.572	1.178	-3.880	.000	-6.891	-2.253	.048	3.880	.972
	orAge	.292	.089	3.282	.001	.117	.467	.035	3.282	.905
	orGender	1.293	.445	2.902	.004	.416	2.170	.027	2.902	.824

[a] Computed using alpha = .05.

APPENDIX T: HYPOTHESIS SEVEN: MANCOVA MODEL ORPHANS RELATIONSHIP TO THEIR HEAD OF HOUSEHOLD

Table T1

Hypothesis Seven: MANCOVA Orphans Relationship to Their Head of Household

Multivariate Tests[a]

Effect		*Value*	*F*	*Hypothesis df*	*Error df*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power[c]*
Intercept	Pillai's Trace	.142	12.160[b]	4	295	.000	.142	48.639	1.000
	Wilks' Lambda	.858	12.160[b]	4	295	.000	.142	48.639	1.000
	Hotelling's Trace	.165	12.160[b]	4	295	.000	.142	48.639	1.000
	Roy's Largest Root	.165	12.160[b]	4	295	.000	.142	48.639	1.000
orAge	Pillai's Trace	.173	15.384[b]	4	295	.000	.173	61.537	1.000
	Wilks' Lambda	.827	15.384[b]	4	295	.000	.173	61.537	1.000
	Hotelling's Trace	.209	15.384[b]	4	295	.000	.173	61.537	1.000
	Roy's Largest Root	.209	15.384[b]	4	295	.000	.173	61.537	1.000
orRelationHH	Pillai's Trace	.035	2.638[b]	4	295	.034	.035	10.554	.735
	Wilks' Lambda	.965	2.638[b]	4	295	.034	.035	10.554	.735
	Hotelling's Trace	.036	2.638[b]	4	295	.034	.035	10.554	.735
	Roy's Largest Root	.036	2.638[b]	4	295	.034	.035	10.554	.735

[a] Design: Intercept + orAge + orRelationHH. [b] Exact statistic. [c] Computed using alpha = .05.

Table T2

Hypothesis Seven: ANCOVA Orphans Relationship to Their Head of Household

Tests of Between-Subjects Effects

Source	Dependent Variable	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[e]
Corrected Model	dMosquito	.043[a]	2	.021	.813	.445	.005	1.625	.189
	dEducation	252.274[b]	2	126.137	25.783	.000	.148	51.567	1.000
	dHours_Fetched_WW	98.766[c]	2	49.383	7.479	.001	.048	14.959	.941
	dHours_Dom_Work	181.613[d]	2	90.806	5.954	.003	.038	11.908	.877
Intercept	dMosquito	.025	1	.025	.954	.330	.003	.954	.164
	dEducation	209.342	1	209.342	42.791	.000	.126	42.791	1.000
	dHours_Fetched_WW	31.652	1	31.652	4.794	.029	.016	4.794	.588
	dHours_Dom_Work	39.632	1	39.632	2.599	.108	.009	2.599	.362
orAge	dMosquito	8.086E-005	1	8.086E-005	.003	.956	.000	.003	.050
	dEducation	239.074	1	239.074	48.869	.000	.141	48.869	1.000
	dHours_Fetched_WW	98.119	1	98.119	14.861	.000	.048	14.861	.970
	dHours_Dom_Work	155.634	1	155.634	10.204	.002	.033	10.204	.890
orRelationHH	dMosquito	.042	1	.042	1.580	.210	.005	1.580	.240
	dEducation	30.466	1	30.466	6.227	.013	.020	6.227	.701
	dHours_Fetched_WW	.184	1	.184	.028	.868	.000	.028	.053
	dHours_Dom_Work	12.342	1	12.342	.809	.369	.003	.809	.146

Error	dMosquito	7.838	298	.026
	dEducation	1457.866	298	4.892
	dHours_Fetched_WW	1967.546	298	6.603
	dHours_Dom_Work	4545.032	298	15.252
Total	dMosquito	8.000	301	
	dEducation	1716.000	301	
	dHours_Fetched_WW	2236.000	301	
	dHours_Dom_Work	4816.000	301	
Corrected Total	dMosquito	7.880	300	
	dEducation	1710.140	300	
	dHours_Fetched_WW	2066.312	300	
	dHours_Dom_Work	4726.645	300	

[a] R Squared = .005 (Adjusted R Squared = -.001). [b] R Squared = .148 (Adjusted R Squared = .142). [c] R Squared = .048 (Adjusted R Squared = .041). [d] R Squared = .038 (Adjusted R Squared = .032). [e] Computed using alpha = .05.

Table T3

Hypothesis Seven: Parameter Estimate Orphans Relationship to Their Head of Household

Parameter Estimates

Dependent Variable	Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% CI*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
						LL	*UL*			
dMosquito	Intercept	.051	.052	.977	.330	-.051	.152	.003	.977	.164
	orAge	.000	.004	.055	.956	-.007	.008	.000	.055	.050
	orRelationHH	-.010	.008	-1.257	.210	-.025	.005	.005	1.257	.240
dEducation	Intercept	-4.615	.705	-6.541	.000	-6.003	-3.226	.126	6.541	1.000
	orAge	.360	.051	6.991	.000	.258	.461	.141	6.991	1.000
	orRelationHH	.262	.105	2.495	.013	.055	.468	.020	2.495	.701
dHours_Fetched_WW	Intercept	-1.794	.820	-2.189	.029	-3.407	-.182	.016	2.189	.588
	orAge	.230	.060	3.855	.000	.113	.348	.048	3.855	.970
	orRelationHH	.020	.122	.167	.868	-.219	.260	.000	.167	.053
dHours_Dom_Work	Intercept	-2.008	1.246	-1.612	.108	-4.459	.443	.009	1.612	.362
	orAge	.290	.091	3.194	.002	.111	.469	.033	3.194	.890
	orRelationHH	-.166	.185	-.900	.369	-.531	.198	.003	.900	.146

[a] Computed using alpha = .05

APPENDIX U: HYPOTHESIS EIGHT: ANCOVA MODEL MOSQUITO NET USAGE

Table U1
Original Model ANCOVA Mosquito Net Usage

Tests of Between-Subjects Effects

Dependent Variable: dMosquito

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	.564[a]	7	.081	2.184	.034	.025	15.287	.824
Intercept	.002	1	.002	.045	.832	.000	.045	.055
orAge	.009	1	.009	.235	.628	.000	.235	.077
orGender	.121	1	.121	3.278	.071	.005	3.278	.440
orHSize	.009	1	.009	.250	.617	.000	.250	.079
orHWealth	.120	1	.120	3.264	.071	.005	3.264	.438
orRelationHH	.126	1	.126	3.408	.065	.006	3.408	.454
orHHGender	.000	1	.000	.004	.950	.000	.004	.050
orHHAge	.018	1	.018	.495	.482	.001	.495	.108
Error	21.957	595	.037					
Total	23.000	603						
Corrected Total	22.521	602						

[a] R Squared = .025 (Adjusted R Squared = .014). [b] Computed using alpha = .05.

Table U2

Original Model Parameter Estimate Mosquito Net Usage

Parameter Estimates

Dependent Variable: dMosquito

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	.014	.065	.212	.832	-.114	.142	.000	.212	.055
orAge	.001	.003	.485	.628	-.005	.008	.000	.485	.077
orGender	.029	.016	1.811	.071	-.002	.060	.005	1.811	.440
orHSize	-.002	.003	-.500	.617	-.007	.004	.000	.500	.079
orHWealth	.011	.006	1.807	.071	-.001	.022	.005	1.807	.438
orRelationHH	-.013	.007	-1.846	.065	-.026	.001	.006	1.846	.454
orHHGender	-.001	.017	-.063	.950	-.035	.033	.000	.063	.050
orHHAge	.000	.001	-.704	.482	-.002	.001	.001	.704	.108

[a] Computed using alpha = .05.

Table U3

Final Model ANCOVA Mosquito Net Usage

Tests of Between-Subjects Effects

Dependent Variable: dMosquito

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	.394[a]	2	.197	5.344	.005	.017	10.688	.840
Intercept	.073	1	.073	1.982	.160	.003	1.982	.290
orHWealth	.181	1	.181	4.915	.027	.008	4.915	.600
orRelationHH	.182	1	.182	4.950	.026	.008	4.950	.603
Error	22.128	601	.037					
Total	23.000	604						
Corrected Total	22.522	603						

[a]. R Squared = .017 (Adjusted R Squared = .014). [b] Computed using alpha = .05.

Table U4

Final Model Parameter Estimate Mosquito Net Usage

Parameter Estimates

Dependent Variable: dMosquito

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	.040	.028	1.408	.160	-.016	.096	.003	1.408	.290
orHWealth	.013	.006	2.217	.027	.001	.024	.008	2.217	.600
orRelationHH	-.014	.006	-2.225	.026	-.026	-.002	.008	2.225	.603

[a] Computed using alpha = .05.

APPENDIX V: HYPOTHESIS NINE: ANCOVA MODEL YEARS ATTENDED SCHOOL

Table V1
Original Model ANCOVA Years Attended School

Tests of Between-Subjects Effects

Dependent Variable: dEducation

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	745.060[a]	7	106.437	19.048	.000	.183	133.334	1.000
Intercept	230.935	1	230.935	41.327	.000	.065	41.327	1.000
orGender	7.803	1	7.803	1.396	.238	.002	1.396	.218
orHSize	.978	1	.978	.175	.676	.000	.175	.070
orAge	672.674	1	672.674	120.380	.000	.168	120.380	1.000
orHWealth	15.877	1	15.877	2.841	.092	.005	2.841	.391
orRelationHH	89.241	1	89.241	15.970	.000	.026	15.970	.979
orHHGender	.979	1	.979	.175	.676	.000	.175	.070
orHHAge	2.550	1	2.550	.456	.500	.001	.456	.104
Error	3330.410	596	5.588					
Total	4120.000	604						
Corrected Total	4075.470	603						

[a] R Squared = .183 (Adjusted R Squared = .173). [b] Computed using alpha = .05.

Table V2

Original Model Parameter Estimate Years Attended School

Parameter Estimates

Dependent Variable: dEducation

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	-5.126	.797	-6.429	.000	-6.691	-3.560	.065	6.429	1.000
orGender	.230	.194	1.182	.238	-.152	.612	.002	1.182	.218
orHSize	-.015	.037	-.418	.676	-.088	.057	.000	.418	.070
orAge	.417	.038	10.972	.000	.342	.491	.168	10.972	1.000
orHWealth	-.121	.072	-1.686	.092	-.263	.020	.005	1.686	.391
orRelationHH	.340	.085	3.996	.000	.173	.507	.026	3.996	.979
orHHGender	.089	.213	.418	.676	-.330	.508	.000	.418	.070
orHHAge	-.005	.007	-.675	.500	-.018	.009	.001	.675	.104

[a] Computed using alpha = .05.

Table V3

Final Model ANCOVA Years Attended School

Tests of Between-Subjects Effects

Dependent Variable: dEducation

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	720.109[a]	2	360.054	64.542	.000	.177	129.083	1.000
Intercept	590.098	1	590.098	105.778	.000	.149	105.778	1.000
orAge	661.201	1	661.201	118.524	.000	.164	118.524	1.000
orRelationHH	116.314	1	116.314	20.850	.000	.033	20.850	.995
Error	3358.344	602	5.579					
Total	4124.000	605						
Corrected Total	4078.453	604						

[a] R Squared = .177 (Adjusted R Squared = .174). [b] Computed using alpha = .05.

Table V4

Final Model Parameter Estimate Years Attended School

Parameter Estimates

Dependent Variable: dEducation

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	-5.295	.515	-10.285	.000	-6.307	-4.284	.149	10.285	1.000
orAge	.410	.038	10.887	.000	.336	.483	.164	10.887	1.000
orRelationHH	.356	.078	4.566	.000	.203	.509	.033	4.566	.995

[a] Computed using alpha = .05.

APPENDIX W: HYPOTHESIS TEN: ANCOVA HOURS SPENT FETCHING WATER OR WOOD

Table W1

Original Model ANCOVA Hours Spent Fetching Water or Wood

Tests of Between-Subjects Effects

Dependent Variable: dHours_Fetched_WW

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	155.280[a]	7	22.183	3.026	.004	.053	21.179	.938
Intercept	16.400	1	16.400	2.237	.136	.006	2.237	.320
orGender	3.807	1	3.807	.519	.472	.001	.519	.111
orHSize	9.284	1	9.284	1.266	.261	.003	1.266	.202
orAge	107.095	1	107.095	14.607	.000	.037	14.607	.968
orHWealth	7.643	1	7.643	1.042	.308	.003	1.042	.175
orRelationHH	.000	1	.000	.000	.995	.000	.000	.050
orHHGender	7.982	1	7.982	1.089	.297	.003	1.089	.180
orHHAge	22.696	1	22.696	3.096	.079	.008	3.096	.419
Error	2778.741	379	7.332					
Total	3066.000	387						
Corrected Total	2934.021	386						

[a] R Squared = .053 (Adjusted R Squared = .035). [b] Computed using alpha = .05.

Table W2

Original Model Parameter Estimate Hours Spent Fetching Water or Wood

Parameter Estimates

Dependent Variable: dHours_Fetched_WW

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	-1.706	1.140	-1.496	.136	-3.948	.537	.006	1.496	.320
orGender	.201	.278	.721	.472	-.347	.748	.001	.721	.111
orHSize	.060	.053	1.125	.261	-.045	.164	.003	1.125	.202
orAge	.210	.055	3.822	.000	.102	.318	.037	3.822	.968
orHWealth	-.114	.111	-1.021	.308	-.332	.105	.003	1.021	.175
orRelationHH	-.001	.124	-.006	.995	-.246	.244	.000	.006	.050
orHHGender	.322	.308	1.043	.297	-.285	.928	.003	1.043	.180
orHHAge	-.018	.010	-1.759	.079	-.038	.002	.008	1.759	.419

[a] Computed using alpha = .05

Table W3

Final Model ANCOVA Hours Spent Fetching Water or Wood

Tests of Between-Subjects Effects

Dependent Variable: dHours_Fetched_WW

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	111.216[a]	1	111.216	15.206	.000	.038	15.206	.973
Intercept	57.918	1	57.918	7.919	.005	.020	7.919	.802
orAge	111.216	1	111.216	15.206	.000	.038	15.206	.973
Error	2823.145	386	7.314					
Total	3066.000	388						
Corrected Total	2934.361	387						

[a] R Squared = .038 (Adjusted R Squared = .035). [b] Computed using alpha = .05.

Table W4

Final Model Parameter Estimate Hours Spent Fetching Water or Wood

Parameter Estimates

Dependent Variable: dHours_Fetched_WW

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	-1.673	.594	-2.814	.005	-2.841	-.504	.020	2.814	.802
orAge	.212	.054	3.900	.000	.105	.319	.038	3.900	.973

[a] Computed using alpha = .05

APPENDIX X: HYPOTHESIS ELEVEN: ANCOVA HOURS SPENT PERFORMING DOMESTIC HOUSEHOLD WORK

Table X1

Original Model ANCOVA Hours Spent Performing Domestic Household Work

Tests of Between-Subjects Effects

Dependent Variable: dHours_Dom_Work

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	686.499[a]	7	98.071	5.199	.000	.093	36.391	.998
Intercept	.001	1	.001	.000	.994	.000	.000	.050
orAge	217.911	1	217.911	11.551	.001	.031	11.551	.924
orGender	164.280	1	164.280	8.708	.003	.024	8.708	.837
orHSize	107.907	1	107.907	5.720	.017	.016	5.720	.665
orHWealth	56.158	1	56.158	2.977	.085	.008	2.977	.406
orRelationHH	33.762	1	33.762	1.790	.182	.005	1.790	.266
orHHGender	6.121	1	6.121	.324	.569	.001	.324	.088
orHHAge	28.076	1	28.076	1.488	.223	.004	1.488	.229
Error	6734.614	357	18.864					
Total	7751.000	365						
Corrected Total	7421.112	364						

[a] R Squared = .093 (Adjusted R Squared = .075). [b] Computed using alpha = .05

Table X2

Original Model Parameter Estimate Hours Spent Performing Domestic Household Work

Parameter Estimates

Dependent Variable: dHours_Dom_Work

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	-.014	1.939	-.007	.994	-3.828	3.800	.000	.007	.050
orAge	.316	.093	3.399	.001	.133	.498	.031	3.399	.924
orGender	1.370	.464	2.951	.003	.457	2.282	.024	2.951	.837
orHSize	-.205	.086	-2.392	.017	-.373	-.036	.016	2.392	.665
orHWealth	-.302	.175	-1.725	.085	-.646	.042	.008	1.725	.406
orRelationHH	-.271	.203	-1.338	.182	-.670	.127	.005	1.338	.266
orHHGender	-.290	.508	-.570	.569	-1.289	.710	.001	.570	.088
orHHAge	-.021	.017	-1.220	.223	-.054	.013	.004	1.220	.229

[a] Computed using alpha = .05

Table X3

Final Model ANCOVA Hours Spent Performing Domestic Household Work

Tests of Between-Subjects Effects

Dependent Variable: dHours_Dom_Work

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[b]
Corrected Model	549.810[a]	3	183.270	9.629	.000	.074	28.886	.998
Intercept	102.205	1	102.205	5.370	.021	.015	5.370	.637
orAge	262.640	1	262.640	13.798	.000	.037	13.798	.959
orGender	151.716	1	151.716	7.971	.005	.022	7.971	.804
orHSize	128.204	1	128.204	6.735	.010	.018	6.735	.735
Error	6871.302	361	19.034					
Total	7751.000	365						
Corrected Total	7421.112	364						

[a] R Squared = .074 (Adjusted R Squared = .066). [b] Computed using alpha = .05.

Table X4

Final Model Parameter Estimate Hours Spent Performing Domestic Household Work

Parameter Estimates

Dependent Variable: dHours_Dom_Work

Parameter	*B*	*Std. Error*	*t*	*Sig.*	*95% C.I.*		*Partial Eta Squared*	*Noncent. Parameter*	*Observed Power*[a]
					LL	*UL*			
Intercept	-3.190	1.377	-2.317	.021	-5.898	-.483	.015	2.317	.637
orAge	.339	.091	3.715	.000	.160	.519	.037	3.715	.959
orGender	1.302	.461	2.823	.005	.395	2.210	.022	2.823	.804
orHSize	-.218	.084	-2.595	.010	-.383	-.053	.018	2.595	.735

[a] Computed using alpha = .05

APPENDIX Y: FREQUENCY OF EDUCATION IN SINGLE YEARS INCLUDING CURRENT

Table Y1
Frequency of Education in Single Years Including Current (2012)

	Freq.	*Cumulative Percent*
0	242	19.9
1	207	36.8
2	223	55.1
3	202	71.7
4	142	83.3
5	81	90.0
6	67	95.5
7	33	98.2
8	12	99.2
9	9	99.9
10	1	100.0
Total	1219	

APPENDIX Z: COMPARISON OF ORPHAN AND NON-ORPHAN MOSQUITO NET USAGE

Table Z1
Non-orphan Mosquito Net Usage

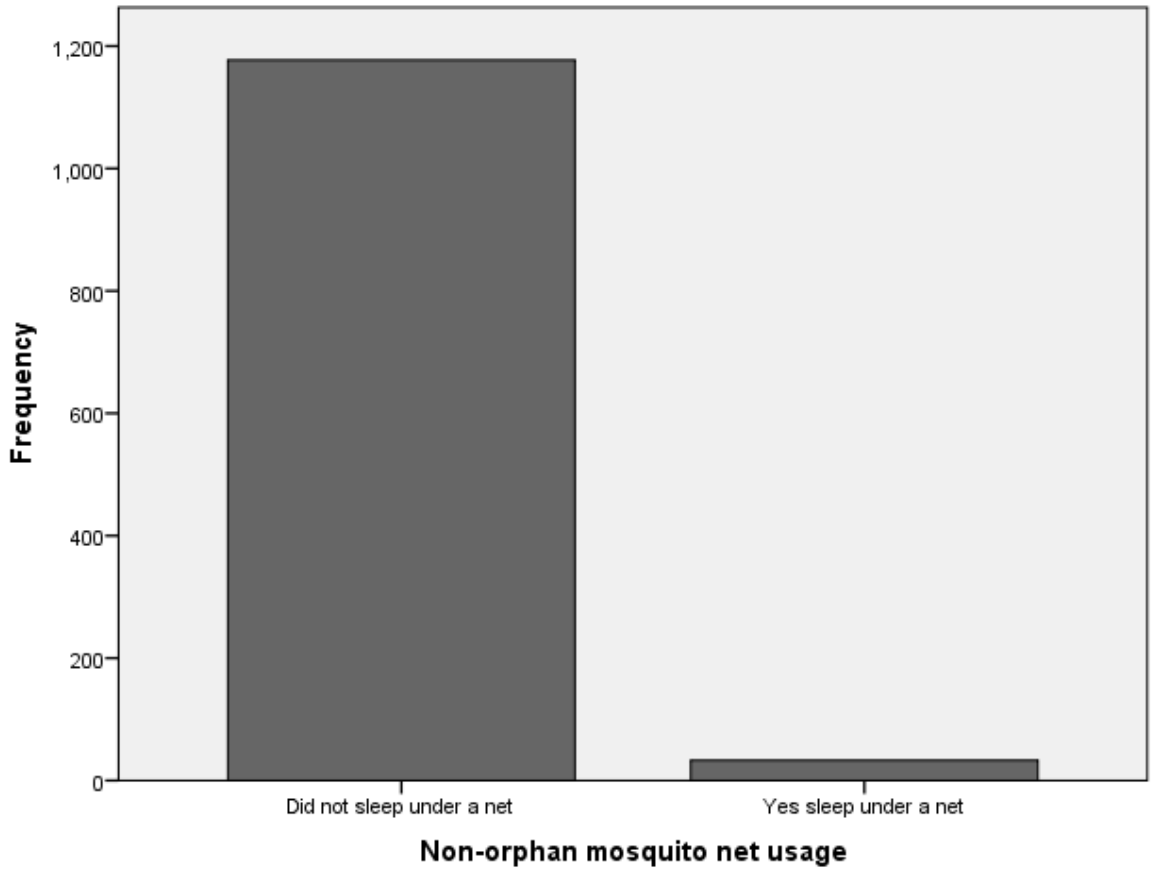


Table Z2
Orphan Mosquito Net Usage